

1991

PERFORMANCE REPORT

WATER QUALITY SECTION

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1991
PERFORMANCE REPORT
WATER QUALITY SECTION

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Ontario Ministry of the Environment

January 1993

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INTRODUCTION

The Water Quality Section is part of the Ministry of the Environment's Laboratory Services Branch (LSB). The Section provides the Ministry with expertise in inorganic chemistry and microbiology. The largest number of tests in the branch are handled by the Water Quality Units, where staff analyze a broad spectrum of environmental sample types including: ground water, surface water, drinking water, precipitation, sewage, industrial waste, leachate, soil and soil extract.

This report provides an outline of the section's quality control (QC) programs for inorganic chemistry and microbiology, along with a summary of the resulting 1991 performance data for each test. The Water Quality Section strives to maintain a high standard of analytical performance through its quality assurance program and QC is an integral part of the process.

ACKNOWLEDGEMENTS

This report is dedicated to the technicians of the Water Quality Section.

and

The author would like to thank the technical staff of the Water Quality Section for their assistance in accumulating the quality control data, and gratefully acknowledges the contribution provided by all supervisors; Delcy Martins for assisting in data entries and Anthony Krasznai for conducting preliminary statistical analysis on the quality control data collected and developing a program for data transfer.

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1.0 PERFORMANCE REPORT FORMAT

The performance report is divided into three parts. Part One outlines the format of this report, Parts Two and Three consist of quality control programs and performance summaries for chemistry and microbiology respectively.

A performance report is generated for each test conducted in the Water Quality Section with the exception of those parameters where no data or less than three pieces of data exist for 1991. The performance report is set up accordingly: first by the alphabetical name of the test eg. Total Organic Carbon is filed under the heading "Carbon, Total Organic"; second by the work station code; and third by the test name code. Where more than one test is performed at a work station, then the test name is bracketed in the title. Each performance report usually consists of three pages: the test description page, the performance data summary page, and the quality control graphics page. The quality control graphics page may not be included for those parameters that do not use quality control standards, or where less than ten pieces of Calibration Control data exist. Detailed information concerning each of these pages is outlined next.

1.1 TEST DESCRIPTION PAGE

TITLE:

The name of the test parameter.

IDENTIFICATION:

Laboratory:	Location where the test is performed.
LIS* Test Name Code:	LIS code for analysis request.
Work Station Code:	LIS code for sample routing to the work station.
Method Code:	LIS code for the analytical procedure.
Sample Type/Matrix:	The various sample types that can be routed to the work station.
Method Introduced:	Date that the method was implemented at the laboratory.
Units:	Unit of measurement in which the results are reported.
Unit Code:	LIS code for the unit of measurement in which the results are reported.
Supervisor:	Name of supervisor responsible for the designated laboratory.

* LIS - Laboratory Information System

SAMPLING:

The type of container and preservative (if applicable) that is used and minimum volume of sample that is usually required (10). Any sample preparation that is normally performed in the field, is also indicated.

SAMPLE PREPARATION:

Sample preparation techniques which are usually performed at the laboratory before analysis.

ANALYTICAL PROCEDURE:

Analytical method used to determine the parameter.

INSTRUMENTATION:

Type of instrumentation, used to perform the test. Automated continuous flow systems, consist of a sampler, peristaltic pump, manifold for reagent addition, detection system and a readout system. Microcomputers are used to control the operation of analytical equipment and/or data acquisition.

REPORTING:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (3)(5). The code <W indicates that no measurable response was observed under the test conditions. The reported value indicates the smallest amount that could have been measured under routine conditions. W is smaller than the standard deviation of duplicates near zero. The <T code is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1,2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

CALIBRATION:

The number of standards used to calibrate the analytical system plus blanks if applicable.

CONTROLS:

The calibration, drift, recovery, and interference controls that are used when applicable to ensure that the system is operating properly.

MODIFICATIONS:

Modifications to the test in 1991.

NOTES:

Explanatory notes which may aid the data user in interpreting results and information.

1.2 PERFORMANCE DATA SUMMARY PAGE

TITLE:

The name of the test parameter.

QUALITY CONTROL DATA FROM/TO:

The period of time during which data were collected.

LAB:

The laboratory in which the data were collected.

ANALYTICAL RANGE:

The full scale value for the analytical range is given in concentration units.

CALIBRATION CONTROL:

A table for the calibration control standards. The between run standard deviation (S), the within run standard deviation (S_w), the ratio S/S_w , and the ranges for acceptance limits of the control standards sums and differences.

RECOVERIES (Where applicable):

A table for the recovery control standards.

DUPLICATES:

A table of within run duplicate data. The data are sorted into a number of concentration spans. The coefficient of variation (%) is obtained by dividing the mean standard deviation (S_2) for a particular concentration span by the mean concentration of duplicate results in that span and multiplying by 100.

OTHER CHECKS (Where applicable):

A table for other checks.

1.3 QUALITY CONTROL GRAPHICS PAGE

TITLE:

The name of the test parameter.

DATE FROM/TO:

Period of time over which data were collected.

CALIBRATION CONTROL:

Calibration control standards sums and differences are plotted on a horizontal scale for the period of data collection (referred to on the graphs as "QUALITY CONTROL STANDARD A+B" for example). The vertical scale consists of the control limits expressed on either side of the expected value. Control limits were chosen from previous analytical performance when available.

PART 2.0

CHEMISTRY

2.1 Quality Control Program, Chemistry

Quality control is a continuous process that involves constant checks of sample processing. Control activities that are conducted before sample analysis begins are checks on reagent chemicals, water purity, materials that are in contact with sample, and calibration.

Reagent chemicals are selected according to specific test method requirements.

Water purity is checked by daily monitoring for conductivity. Operations generally require conductivity levels of ≤ 1 uS/cm. Some procedures require purer water and this is accomplished by further refining the distilled water through a deionizing system.

Material checks are done on sample containers, filters, glassware and other equipment. These are checked for leaching, adsorption and contamination.

Calibration is conducted by analyzing a series of calibration standards covering the analytical range. Since a high degree of both precision and accuracy is required to detect and minimize any between-run changes, the standards are analyzed with as little handling as possible.

Once a system has been calibrated, quality control begins. Depending on the analytical procedure, quality control may be used to evaluate: calibration, blank, recovery, sensitivity, potential interference, and sample repeatability.

Calibration and Blank

Calibration is controlled by a minimum of two quality control standards and a long term blank which are prepared and maintained independently of the calibration standards. The system is not calibrated with the quality control standards. The long term blank is prepared identical to the quality control standards but with zero concentration of the analyte. Control standards are prepared less frequently than calibration standards and errors in newly prepared calibration standards can be detected by this cross check. Newly prepared control standards are run in parallel with the old control standards and must meet control requirements over three consecutive runs before the new standards are accepted on line.

The control standards data are assessed and compared against the control limits established from previous data to determine whether the calibration process is in control. The control limits are examined yearly and may be adjusted if the method performance improves and/or the historical data base is increased. Control limits are calculated for the sum (A+B) and differences (A-B) of the control standards by the equations $(A + B) \pm 4.0 \times S_{A-B}$ and $(A - B) \pm 3.0 \times S_{A-B}$ respectively (1). If a control limit is exceeded, the analysis is stopped, corrective action taken and the control standards are re-analyzed.

The standard deviation of the control standards is used to estimate the between run standard deviation (S) and is compared against the within run standard deviation (S_w). If the ratio S/S_w exceeds 1.5 then poor control of systematic error can be inferred (1). Values for S and S_w are calculated as follows:

$$2S^2 = (S_A)^2 + (S_B)^2$$

$$2S_w^2 = (S_{A-B})^2$$

Where

S_A = standard deviation of control standard A

S_B = standard deviation of control standard B

S_{A-B} = standard deviation of the difference between control standards A and B

NOTE: If a second range is employed for a test, more control standards are used because, in many systems, the between run standard deviations are concentration dependent.

Detailed description of the quality control processes are outlined in several LSB reports (2)(3)(4)(5).

Recovery

Some methods require sample pre-treatment, such as digestion or extraction. A recovery check, suitable to that method, is required to estimate the efficiency of the pre-treatment. Recovery standards are usually prepared at 0%, 20% and 80% of full scale. The solutions are analyzed in the same manner as routine samples. Although these solutions are not used to calibrate the instrument, corrections for the blank and matrix effects are calculated and applied if necessary. For an analytical run to be accepted, the recoveries should be within $\pm(5\% + T/2)$ of their expected values. (T is defined in Appendix A). The average blank should be within three standard deviations of its historical mean. If a second range is employed for a test, at least one additional recovery standard is used.

Sensitivity and Baseline

Any change in the sensitivity of the instrumentation is monitored periodically by analyzing a standard that is usually 80% of full scale, and comparing the peak height to the original calibration standards. Baseline drift is usually recorded by periodic analysis of deionized, distilled water (DDW) which does not contain any of the analyte, but may be adjusted to correspond to sample pre-treatment.

Interference

Interference checks are run on any test where a substance may be present in large enough concentration to affect the results. The checks are near the threshold concentration, beyond which the methodological safeguards used to minimize the interferences are no longer effective. These checks indicate that the interferences have no effect up to the specified concentrations. Spiked samples are not analyzed on a routine basis.

Sample Repeatability

Generally, one sample out of twenty is run in duplicate up to a maximum of three per day. The samples are selected for non-adjacent, within-run duplicate analyses. By analyzing samples in duplicate, the ability of the analyst to obtain repeatable analytical results, within an analytical run, can be determined. For results to be acceptable, at least two-thirds of the duplicate data must conform to limits which are based on historical performance.

The observed differences in duplicate results are accumulated and sorted according to sample concentration span. A standard deviation is calculated for each sample concentration span. The algorithm differs from the conventional standard deviation as follows:

Conventional Std. Dev.
(1)*

Std. Dev. of Duplicates
(2)*

* standard deviations calculated for the performance report data summary pages

$$S_1 = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n - 1}}$$

$$S_2 = \sqrt{\frac{\sum_{i=1}^{n'} (x_1 - x_2)_i^2}{2n'}}$$

Where

S_1 = sample standard deviation

S_2 = duplicate difference standard deviation

n = number of data

$\bar{x}$ = mean of data

x_i = i^{th} result

$(x_1 - x_2)_i$ = difference of the i^{th} duplicate

n' = number of duplicate pairs

Reported values for duplicate standard deviations have been treated by robust statistical methods (6)(7). The standard deviation (S_2) of the duplicate difference is also expressed as the coefficient of variation (CV)

$$CV = \frac{S_2}{\bar{x}} \times 100$$

**2.2 PERFORMANCE SUMMARIES
CHEMISTRY**

*** ACIDITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: ACDT	Units	: mg/L as CaCO ₃
Work Station Code	: PHACD	Unit Code	: 064915
Method Code	: 001BT2	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow, Domestic Waters, Rivers, Lakes (by special request: Industrial Waste, Sewage)		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated in an automated system with 0.01 N sodium hydroxide to pH >8.3. The titrant is standardized against 0.005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant.

pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
--------------------------------	-----------------------	---------------

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
-------------	-----------------------------------

ACIDITY

QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91

Lab: Titration

Analytical Range: - to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	49	25.0	25.08	0.08	0.4357
B :	49	10.0	10.20	0.20	0.3190
A+B :	49	35.0	35.28	0.28	0.6740
A-B :	49	15.0	14.87	-0.13	0.3590

s.d.(AB) S(between runs): 0.38 Sw(within run): 0.25 S/Sw: 1.50

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.57 - 37.43 for A+B
13.38 - 16.62 for A-B

DUPLICATES:

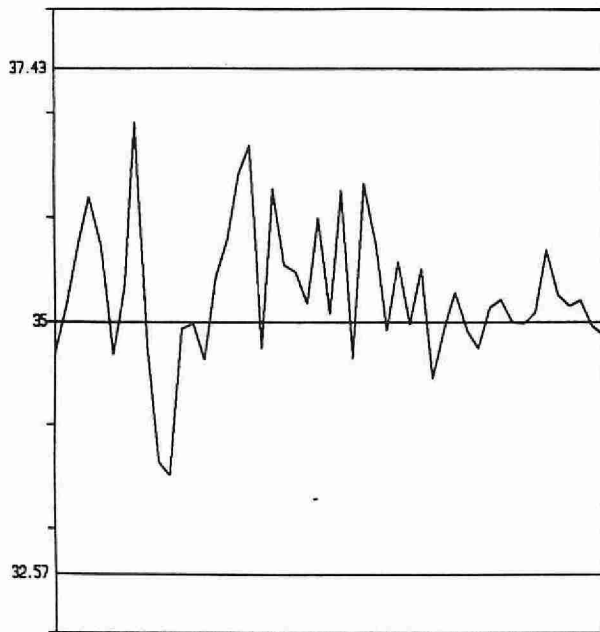
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
36	0.0 - 2.0	0.1106	7.5
67	2.0 - 5.0	0.1292	3.6
19	5.0 - 15.0	0.1767	2.4
0	15.0 - 100.0	N.A	N.A.
122	Overall	0.1318	

OTHER CHECKS:

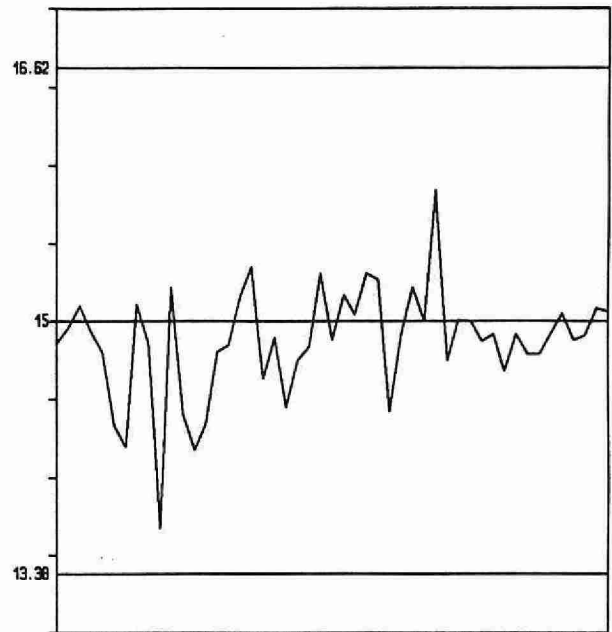
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	44	0.858	0.119

ACIDITY (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** ACIDITY, GRAN *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/08/82
LIS Test Name Code	: ACDG	Units	: ug/L as H ⁺
Work Station Code	: PHACD	Unit Code	: 064801
Method Code	: 001BT5	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated with 0.01 N sodium hydroxide to pH >8.3. The titrant is standardized against 0.0005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. Data are subjected to Gran analysis.

pH and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
--------------------------------	--------------------	------------

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: LTBL (expected result is 16.6 ug/L as H) plus 2 standards, e.g. QCA
-------------	---

ACIDITY, GRAN

QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91

Lab: Titration

Analytical Range: - to 1000 ug/L as H⁺

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	49	500.0	501	1.0	8.78
B :	49	200.0	203	3.0	6.15
A+B :	49	700.0	704	4.0	13.30
A-B :	49	300.0	297	-3.0	7.27

s.d.(AB) S(between runs): 7.6 Sw(within run): 5.1 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

657.7 - 742.3 for A+B
271.8 - 328.2 for A-B

DUPLICATES:

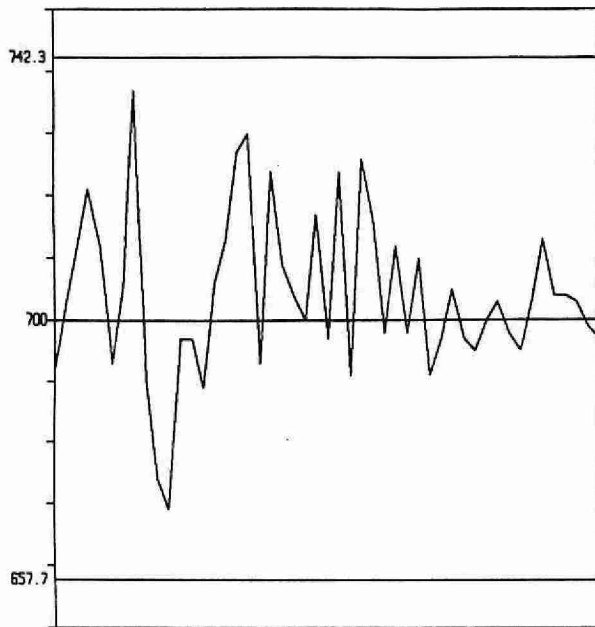
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
33	0	-	40	1.930	6.3
68	40	-	100	2.548	3.4
19	100	-	250	3.739	2.6
0	250	-	1000	N.A.	N.A.
120	Overall			2.505	

OTHER CHECKS:

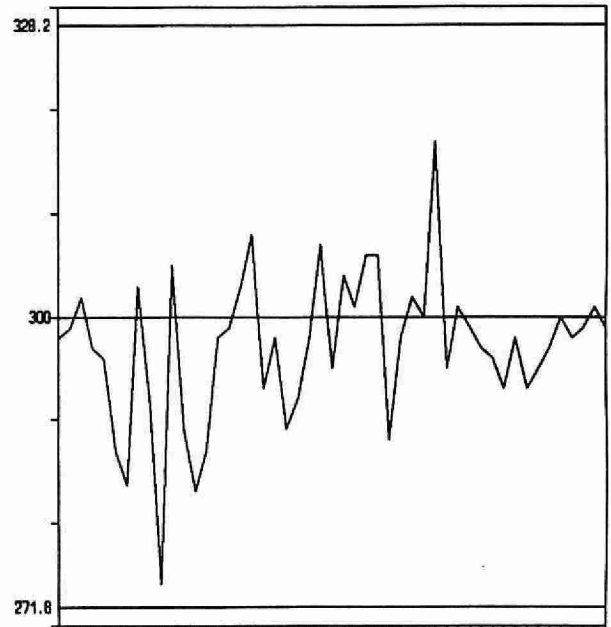
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	49	16.55	2.807

ACIDITY, GRAN (ug/L as H⁺)

QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: A. Neary
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required	: 150 mL
Container	: Amber polyethylene bottle filled to the brim; screw cap with cone-shaped liner is preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 2 standard buffers - once daily

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91

Lab: Dorset

Analytical Range: - to 80.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	217	20	20.11	0.11	0.290
B :	217	5	4.95	-0.05	0.122
A+B :	217	25	25.06	0.06	0.389
A-B :	217	15	15.16	0.16	0.210

s.d.(AB) S(between runs): 0.22 Sw(within run): 0.15 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

24	-	26	for	A+B
14	-	16	for	A-B

DUPLICATES:

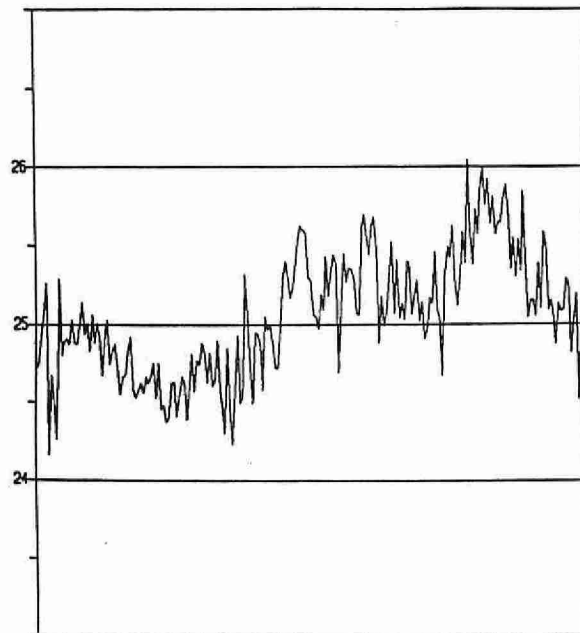
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
312	0.00	-	5.00	0.087	8.9
192	5.00	-	25.00	0.095	3.7
20	25.00	-	80.00	0.125	9.8
524	Overall			0.090	

OTHER CHECKS:

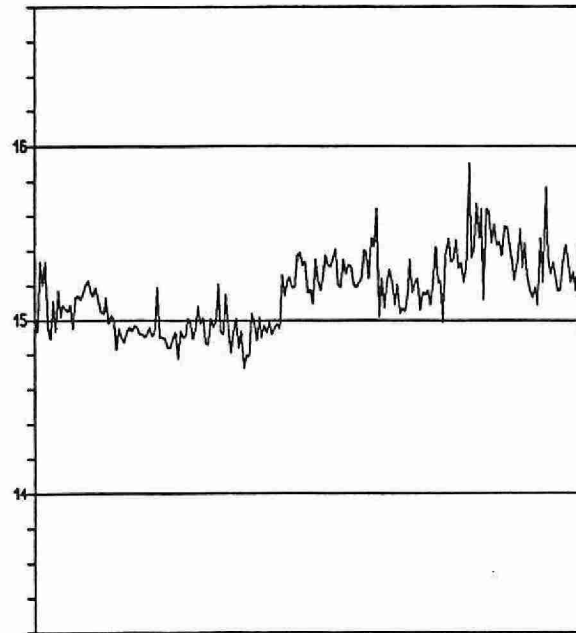
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	217	1.68	0.322

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO_3)

QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** ALKALINITY, TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

pH, Gran alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 4 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	90	250.0	250.1	0.1	1.839
B :	90	50.0	49.7	-0.3	1.082
A+B :	90	300.0	299.8	-0.2	2.015
A-B :	90	200.00	200.4	0.4	2.246
C :	90	10.0	10.04	0.04	0.202
D :	90	2.5	2.52	0.02	0.125
C+D :	90	12.5	12.56	0.06	0.270
C-D :	90	7.5	7.52	0.02	0.200

s.d.(AB) S(between runs): 1.51 Sw(within run): 1.59 S/Sw: 0.95

s.d.(CD) S(between runs): 0.17 Sw(within run): 0.14 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

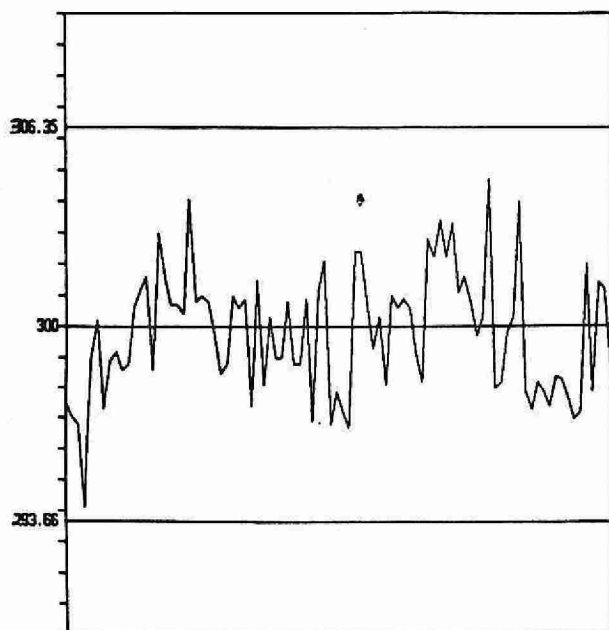
293.66	-	306.35	for	A+B
195.77	-	204.23	for	A-B
11.67	-	13.33	for	C+D
6.95	-	8.05	for	C-D

DUPLICATES:

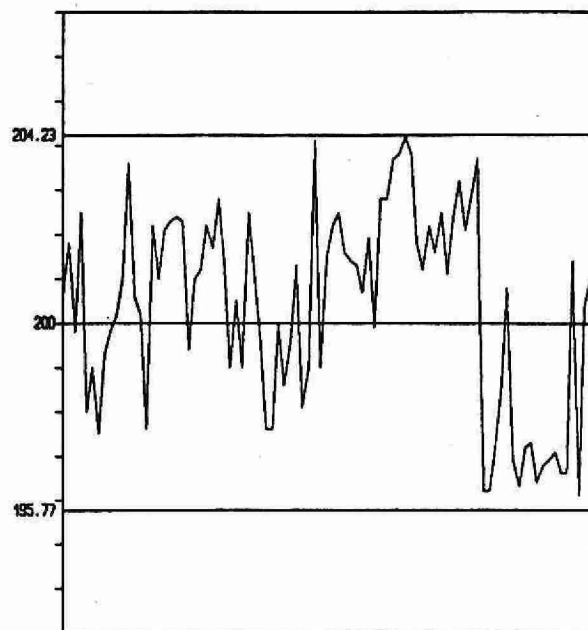
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
41	0.0	-	50.0	0.1715	1.6
30	50.0	-	100.0	0.6048	0.6
174	100.0	-	500.0	1.2461	1.1
0	500.0	-	1000.0	N.A.	N.A.
205	OVERALL			1.1192	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

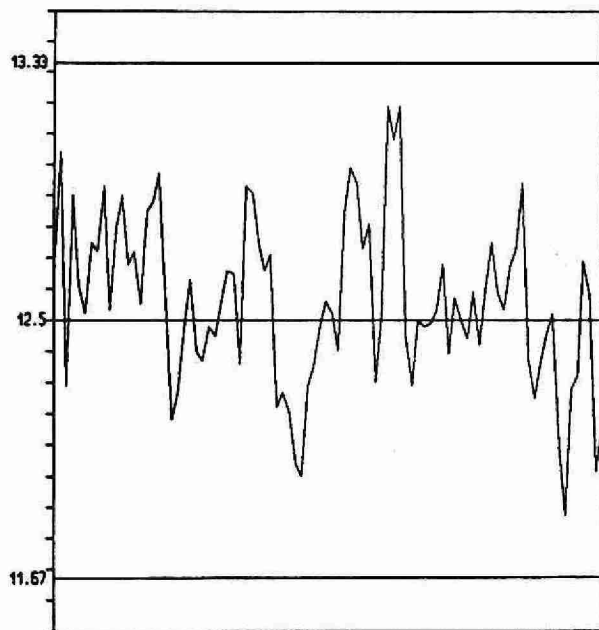
QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91



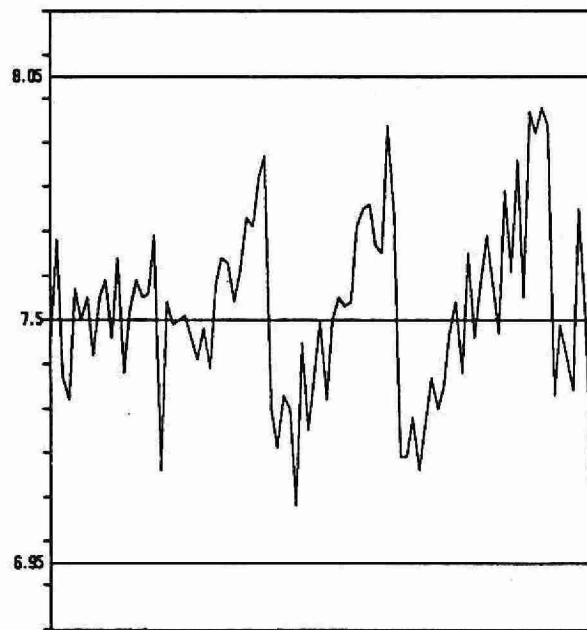
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.
pH, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : BL plus 3 standards, e.g. QCA
Drift : In run standards throughout the run (tap water diluted to 50% V/V)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	137	250	250.90	0.90	2.096
B :	137	100	101.60	1.60	1.443
A+B :	137	350	352.45	2.45	2.951
A-B :	137	150	149.26	-0.74	2.060
C :	137	100	100.65	0.65	1.009
D :	137	25	24.99	-0.01	0.348
C+D :	137	125	125.64	0.64	1.207
C-D :	137	75	75.66	0.66	0.906

s.d.(AB) S(between runs): 1.80 Sw(within run): 1.46 S/Sw: 1.24

s.d.(CD) S(between runs): 0.75 Sw(within run): 0.64 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

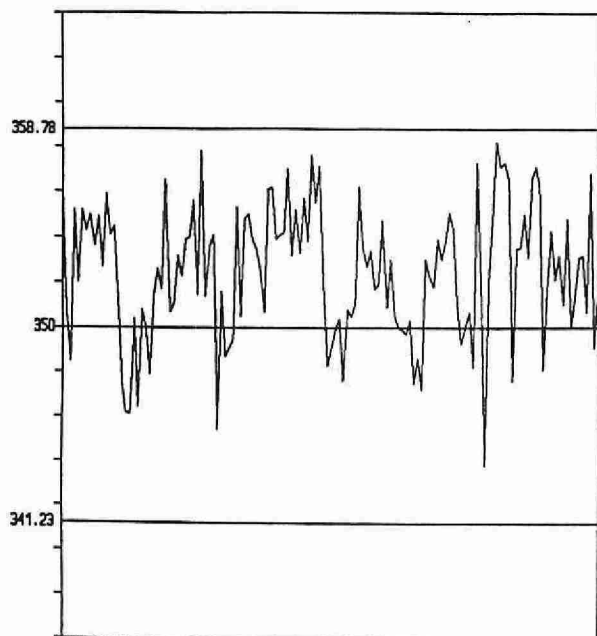
341.23	-	358.78	for A+B
144.15	-	155.85	for A-B
119.20	-	130.80	for C+D
71.13	-	78.87	for C-D

DUPLICATES:

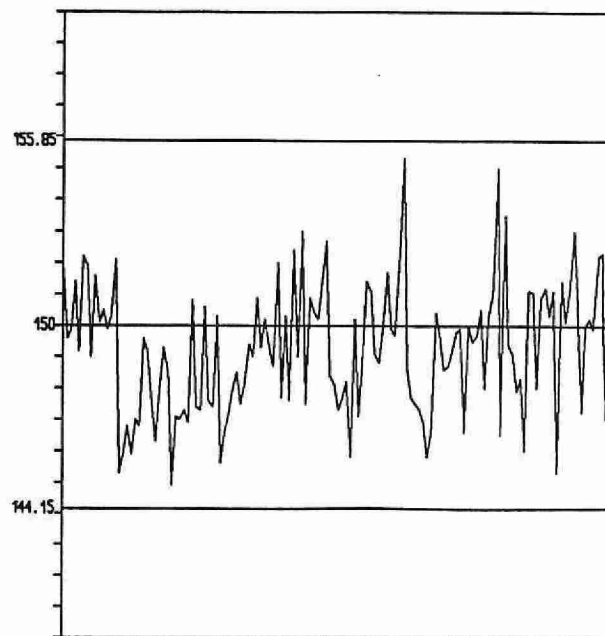
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
34	0.0	- 25.0	0.2181	1.7
113	25.0	- 100.0	0.8453	1.8
208	100.0	- 500.0	1.7741	2.2
8	500.0	- 1000.0	2.1872	1.3
363	Overall		1.3014	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

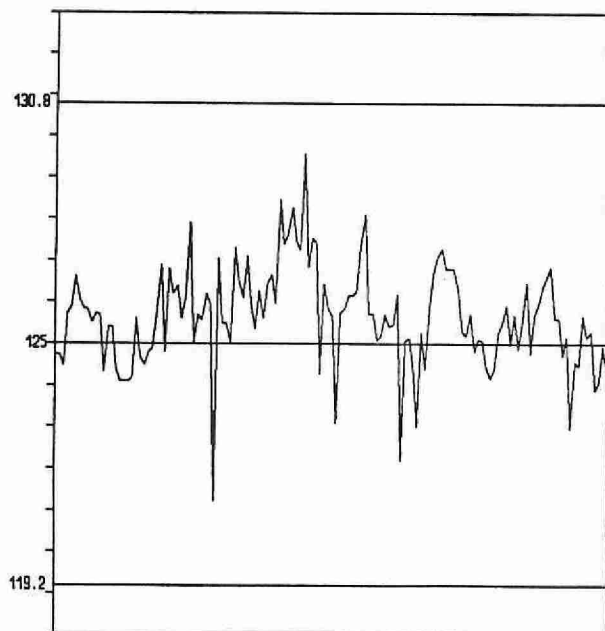
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



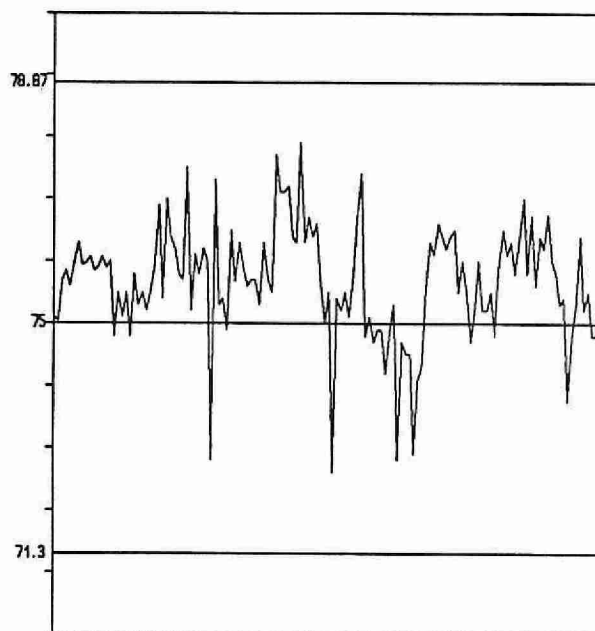
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before 1980
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WQSDIRT	Unit Code	: 064915
Method Code	: 003MT3	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are pipetted manually (50.0 mL) and titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. Analysis is performed on the supernatant or filtrate.

INSTRUMENTATION:

Automated modular titration system .

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA
Drift : In run standards throughout the run (100% tap water)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 07/01/91 TO 23/12/91

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	29	570.0	567.7	-2.3	2.791
B :	29	114.0	115.7	1.7	0.605
A+B :	29	684.0	683.4	-0.6	3.042
A-B :	29	456.0	452.0	-4.0	2.656

s.d.(AB) S(between runs): 2.02 Sw(within run): 1.88 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

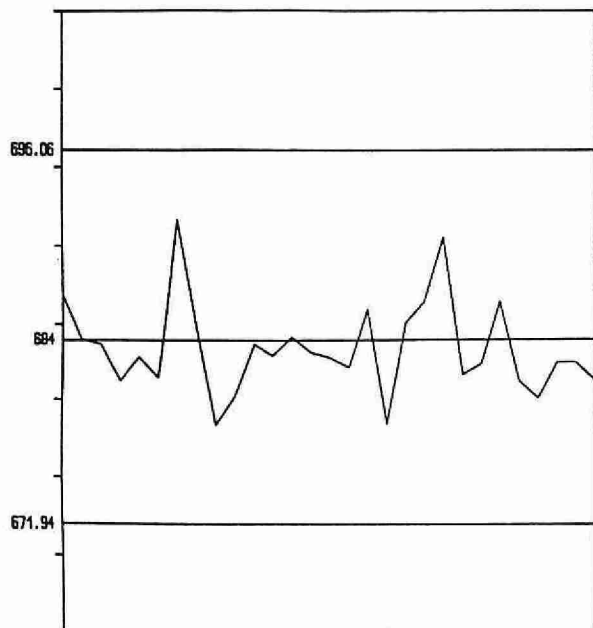
671.94 - 696.06 for A+B
447.96 - 464.04 for A-B

DUPLICATES:

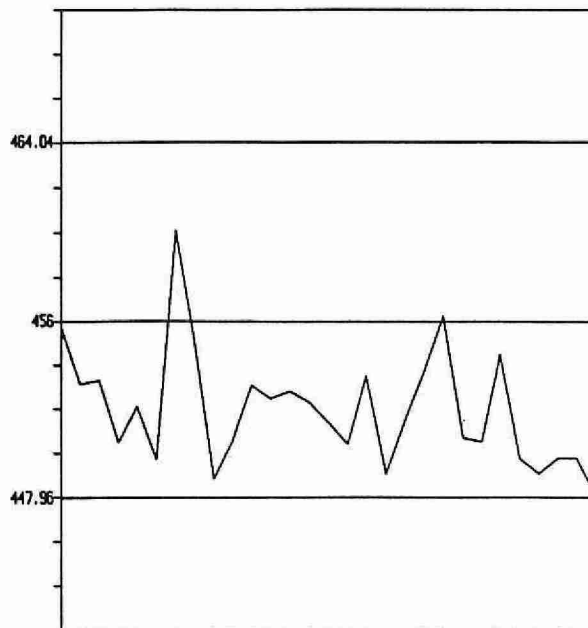
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
30	0.0 - 150.0	0.295	1.0
25	150.0 - 250.0	0.726	1.2
17	250.0 - 500.0	0.506	3.6
9	500.0 - 1000.0	3.042	0.8
81	OVERALL	0.616	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 07/01/91 TO 23/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 21/10/85
LIS Test Name Code	: ALKT3	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: A. Neary
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required	: 150 mL
Container	: Amber polyethylene bottle filled to the brim; screw cap with cone-shaped liner is preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 3.8. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 2 standard buffers - once daily

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 04/01/91 TO 14/12/91

Lab: Dorset

Analytical Range: - to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	217	20.00	20.45	0.45	0.382
B :	217	5.00	5.04	0.04	0.439
A+B :	217	25.00	25.49	0.49	0.701
A-B :	217	15.00	15.40	0.40	0.430

s.d.(AB) S(between runs): 0.30 Sw(within run): 0.41 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.28 - 26.72 for A+B
13.50 - 16.50 for A-B

DUPLICATES:

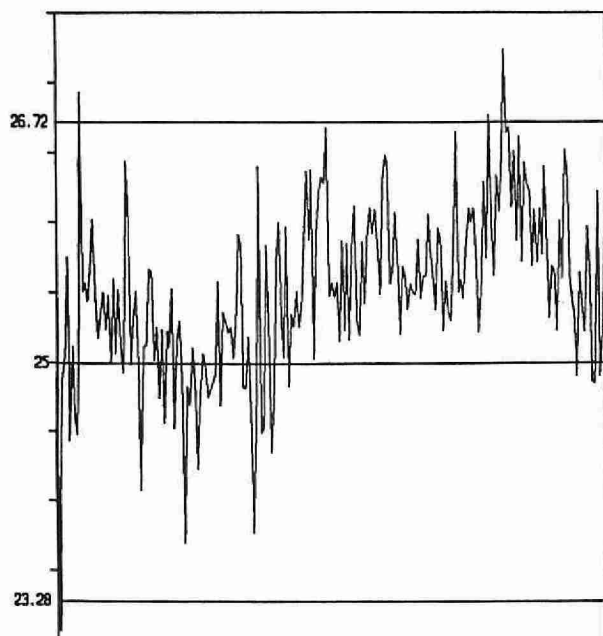
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
250	0.0 - 10.0	0.300	4.1
289	10.0 - 20.0	0.338	2.5
54	20.0 - 50.0	0.277	1.0
12	50.0 - 100.0	0.187	0.2
605	Overall	0.313	

OTHER CHECKS:

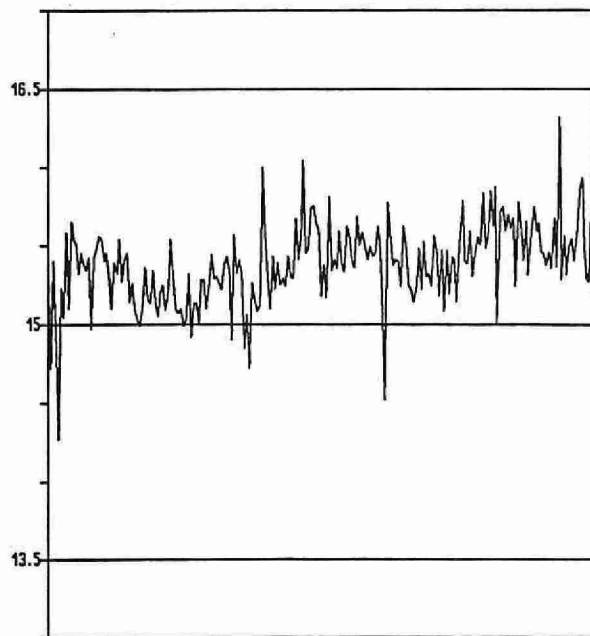
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	217	8.57	0.565

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 04/01/91 TO 14/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** ALKALINITY, GRAN *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T6	Supervisor	: A. Neary
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL
Container : 250 mL Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH <3.7. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis. N.B. pH is determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 2 standard buffers - 2 times daily

ALKALINITY, GRAN

QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91

Lab: Dorset

Analytical Range: - to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	219	20.00	20.22	0.22	0.271
B :	219	5.00	4.96	-0.04	0.136
A+B :	219	25.00	25.17	0.17	0.373
A-B :	219	15.00	15.26	0.26	0.214
C :	219	-5.0	-4.94	0.06	0.291
D :	219	-1.25	-1.25	0.00	0.189
C+D :	219	-6.25	-6.21	0.04	0.380
C-D :	219	-3.75	-3.69	0.06	0.311

s.d.(AB) S(between runs): 0.21 Sw(within run): 0.15 S/Sw: 1.42

s.d.(CD) S(between runs): 0.25 Sw(within run): 0.22 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

24	-	26	for	A+B
14	-	16	for	A-B
-8.89	-	-3.61	for	C+D
-5.73	-	-1.77	for	C-D

DUPLICATES:

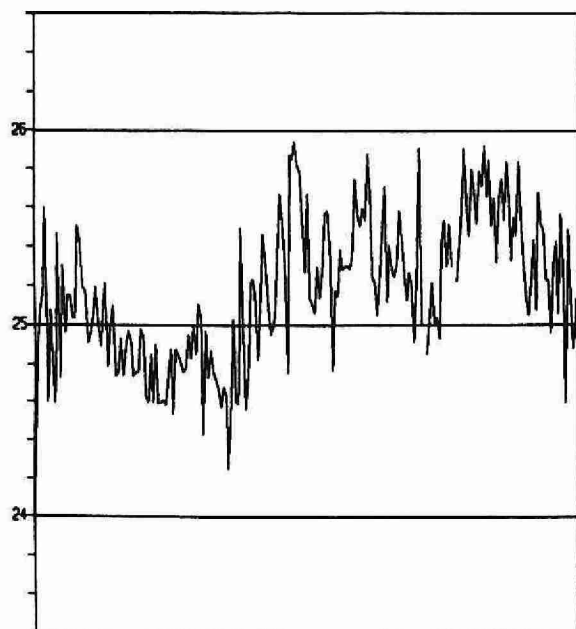
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
150	-8.0	-	0.0	0.100	N.A.
95	0.0	-	1.0	0.085	17.0
216	1.0	-	5.0	0.087	3.5
79	5.0	-	10.0	0.114	2.4
51	10.0	-	25.0	0.137	1.1
591	Overall				

OTHER CHECKS:

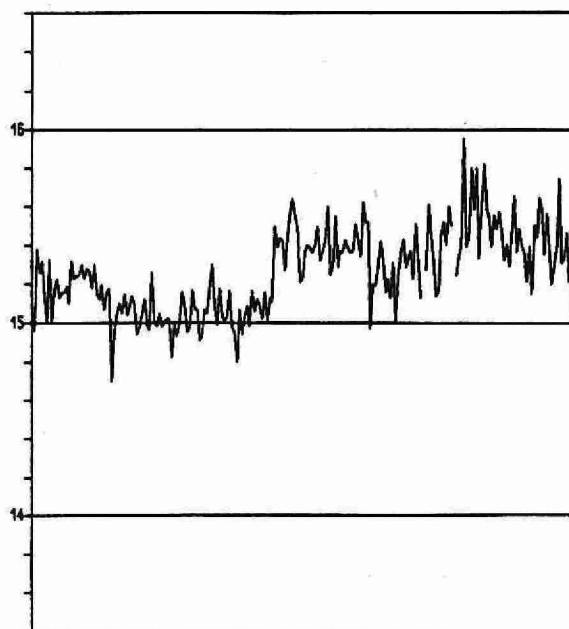
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	219	-0.188	0.192

ALKALINITY, GRAN (mg/L as CaCO₃)

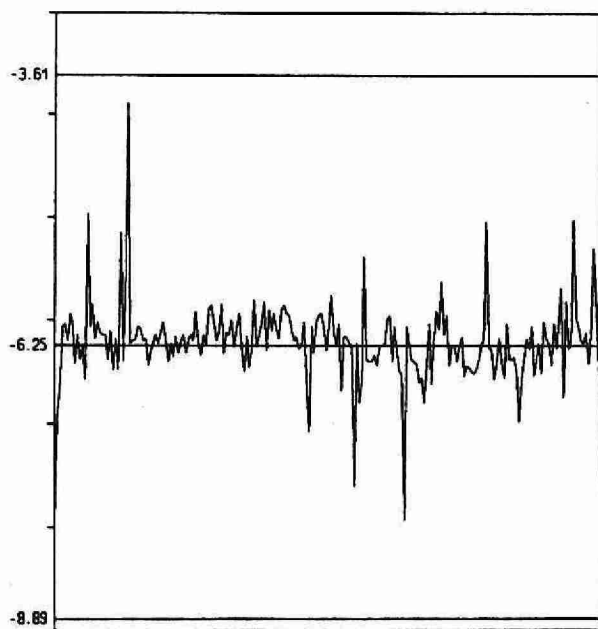
QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91



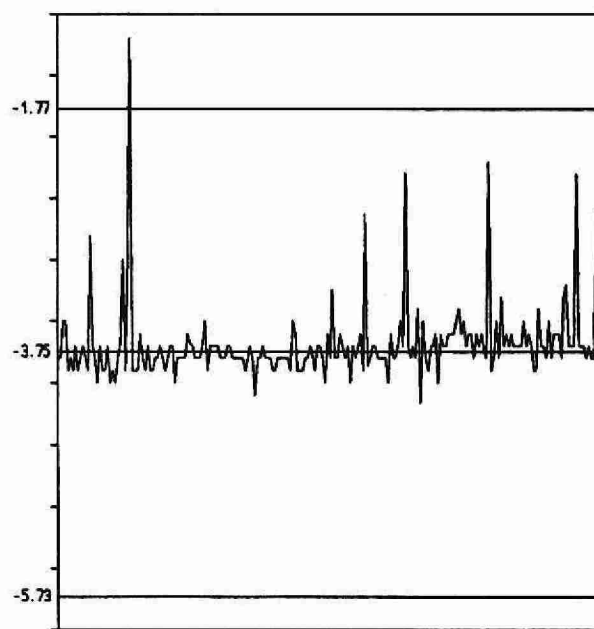
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** ALKALINITY, GRAN *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis. pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus two standards, e.g. QCA
Drift	: In run standards throughout the run (diluted tap water 20% V/V)

ALKALINITY, GRAN

QUALITY CONTROL DATA FROM 01/03/91 TO 24/12/91

Lab: Titration

Analytical Range: - to 25.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
C :	27	10.0	10.093	0.093	0.1944
D :	27	2.5	2.566	0.066	0.1115
C+D :	27	12.5	12.659	0.159	0.2423
C-D :	27	7.5	7.527	0.027	0.2042

s.d.(CD) S(between runs): 0.158 Sw(within run): 0.144 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

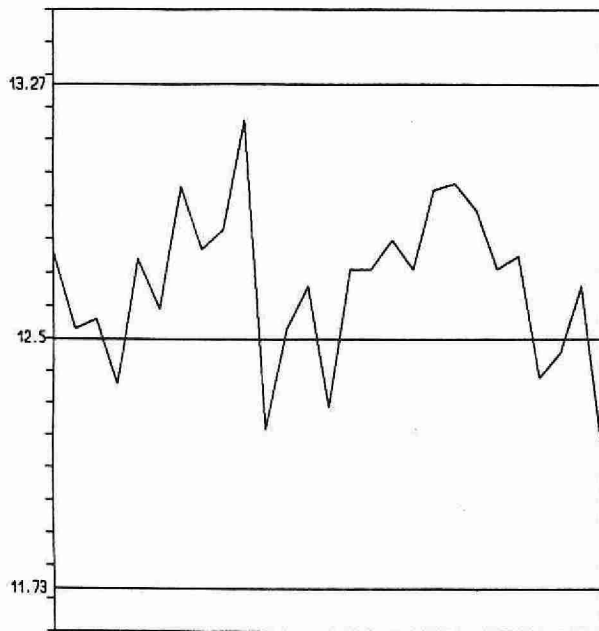
11.73 - 13.27 for C+D
6.99 - 8.01 for C-D

DUPLICATES:

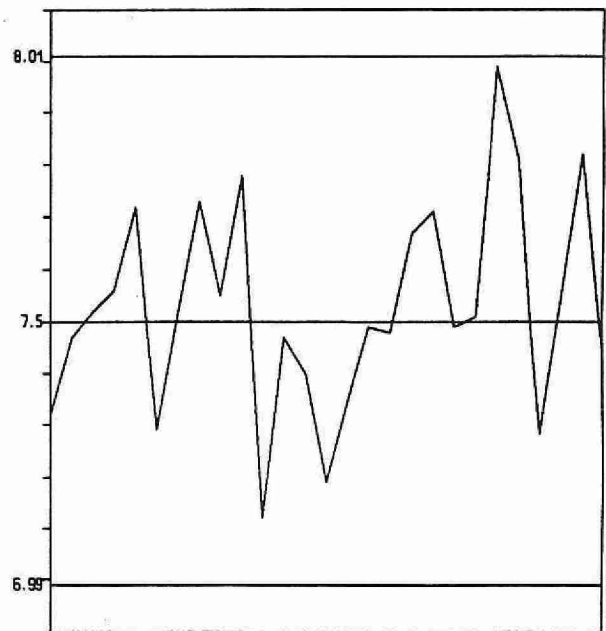
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	-2.0 - 10.0	0.1348	4.1
6	10.0 - 25.0	0.3926	2.3
14	Overall	0.2241	

ALKALINITY, GRAN (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 01/03/91 TO 24/12/91



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

_____ CONTROL LIMIT

***** ALUMINUM, ACID AMMONIUM OXALATE EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: ALEOX	Units	: % by wt as Al
Work Station Code	: DOMETOX	Unit Code	: 070813
Method Code	: 302AA5	Supervisor	: A. Neary
Method Reference No.	: E3032A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 1 g
Container	: Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2 mm. A subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples (0.25 g) are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are centrifuged and the analysis is performed on the supernatant. The solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame. N.B. Iron, manganese and silicon may be determined on the same extract.

INSTRUMENTATION:

Varian AA 1275 with programmable sample changer and Gilson Minipuls II pump.
Balance accurate 0.001g.

REPORTING:

Maximum Significant Figures: 2	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: Three long term soil samples, representing different soil types, 2 method blanks, QC solutions at 25% and 75% of scale, round robin ECSS samples.
Drift	: BL plus 1 standard (100% F.S.) every 10 samples.

ALUMINUM, ACID AMMONIUM OXALATE EXTRACTABLE

QUALITY CONTROL DATA FROM 11/02/91 TO 13/02/91

Lab: Dorset Soils

Analytical Range: - to 2.00 % by wt. Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	1.50	1.517	0.017	0.021
B :	3	0.50	0.487	-0.013	0.015
A+B :	3	2.00	2.003	0.003	0.031
A-B :	3	1.00	1.030	0.030	0.020

s.d.(AB) S(between runs): 0.018 Sw(within run): 0.014 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.70 - 2.30 for A+B
0.80 - 1.20 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.35	0.030
R2 :	3	0.82	0.044
R3 :	3	0.58	0.020

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.40	N.A.	N.A.
0	0.40 - 1.00	N.A.	N.A.
8	1.00 - 2.00	0.083	5.4
9	Overall	0.078	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0	0

***** ALUMINUM, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEDI	Units	: % by wt.Al
Work Station Code	: DOMETDI	Unit Code	: 070813
Method Code	: 301AA5	Supervisor	: A. Neary
Method Reference No.	: E3031A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500um (35 mesh)

ANALYTICAL PROCEDURE:

Aluminum is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron (and Manganese, when required) may be determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; two QC solutions at 25% and 75% of full scale, 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE

QUALITY CONTROL DATA FROM 21/01/91 TO 25/01/91

Lab: Dorset Soils

Analytical Range: - to 1.00 % by wt. Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	0.75	0.743	-0.007	0.0058
B :	3	0.25	0.270	0.020	0.0173
A+B :	3	1.00	1.013	0.013	0.0153
A-B :	3	0.50	0.473	-0.027	0.0208

s.d.(AB) S(between runs): 0.013 Sw(within run): 0.015 S/Sw: 0.88

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 - 1.07 for A+B
0.45 - 0.55 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.38	0.012
R2 :	3	0.62	0.000
R3 :	3	0.38	0.010

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.20	N.A.	N.A.
0	0.20 - 0.50	N.A.	N.A.
8	0.50 - 1.00	0.0436	9.14
9	Overall	0.0400	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.000	0.0000

*** ALUMINUM, EXCHANGEABLE CATIONS ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALESC	Units	: meq/100 g
Work Station Code	: DOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Al by AAS at 309.3 nm with a NO₂ acetylene flame.

Approximate absorbance: 0.2 at the full scale level.

N.B. Calcium, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

ALUMINUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 07/01/91 TO 14/01/91

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	1.88	1.875	-0.005	0.0526
B :	4	0.63	0.608	-0.023	0.0486
A+B :	4	2.51	2.485	-0.025	0.0580
A-B :	4	1.25	1.268	0.018	0.0842

s.d.(AB) S(between runs): 0.051 Sw(within run): 0.060 S/Sw: 0.850

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.24 - 2.78 for A+B
1.06 - 1.44 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	0.063	0.0170
R2 :	4	0.238	0.0222
R3 :	4	1.463	0.1228

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.00 - 0.50	0.0460	13.4
4	0.50 - 1.25	0.0979	11.8
1	1.25 - 2.50	N.A.	N.A.
11	Overall	0.0638	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	4	0.0000	0.0000

***** ALUMINUM, REACTIVE SPECIES *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	24/10/85
LIS Test Name Code	: ALEXCV,ALNDCV	Units	: ug/L as Al
Work Station Code	: DOALSP	Unit Code	: 063813
Method Code	: 0928C2	Supervisor	: A. Neary
Method Reference No.	: E3256A, E3020A		
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required : 30 mL
Container : Plastic or glass

ANALYTICAL PROCEDURE:

The procedure is based on the formation of an aluminum catechol-violet complex at pH 6.2. Phenanthroline hydroxylamine HCl reagents are used to reduce interference by iron. An ion exchange column is used for separating organic and inorganic aluminum. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards and reported as ug/L as CV reactive Al.

INSTRUMENTATION:

Automated auto-analyzer/sampler system with colourimeter and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 10 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA
Drift : BL every 10 samples and BL plus check standard every 20 samples

ALUMINUM, REACTIVE SPECIES (ALEXCV)

QUALITY CONTROL DATA FROM 16/01/91 TO 27/08/91

Lab: Dorset

Analytical Range: - to 1000 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	86	750.0	750.6	0.6	7.43
B :	86	250.0	246.6	-3.4	4.34
A+B :	86	1000.0	997.2	-2.8	10.19
A-B :	86	500.0	503.9	3.9	6.63
C :	86	75.0	73.9	-1.1	3.37
D :	86	25.0	24.7	-0.3	3.17
C+D :	86	100.0	98.6	-1.4	5.63
C-D :	86	50.0	49.2	-0.8	3.34

s.d.(AB) S(between runs): 6.08 Sw(within run): 4.69 S/Sw: 1.30

s.d.(AB) S(between runs): 3.27 Sw(within run): 2.36 S/Sw: 1.39

On any given day the calibration is accepted if the values obtained lie within the ranges:

963	-	1037	for	A+B
475	-	525	for	A-B
85	-	115	for	C+D
40	-	60	for	C-D

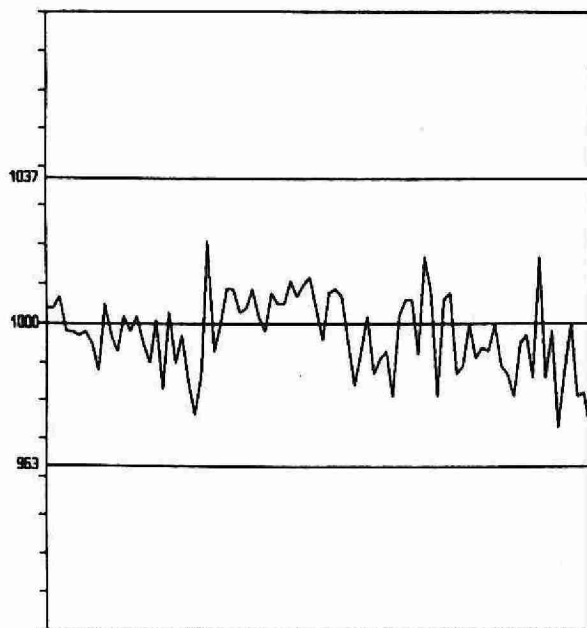
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
124	0	-	50	3.55	18.6
70	50	-	100	3.86	6.1
54	100	-	250	4.17	2.9
1	250	-	500	N.A.	N.A.
0	500	-	1000	N.A.	N.A.
249	Overall			3.75	

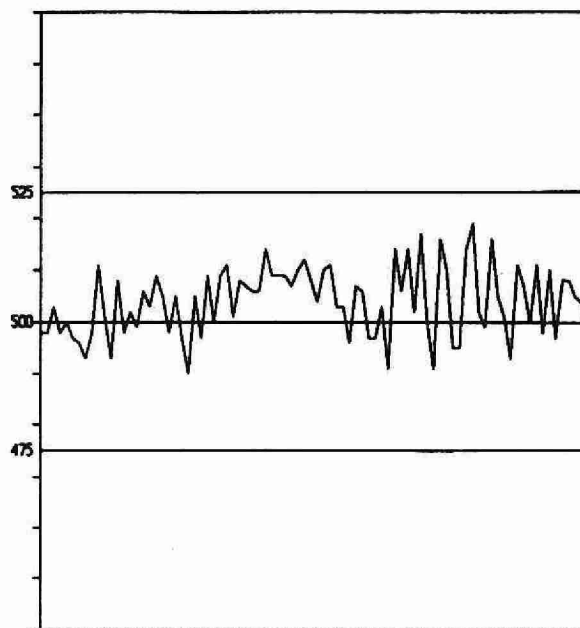
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	86	0.186	0.914

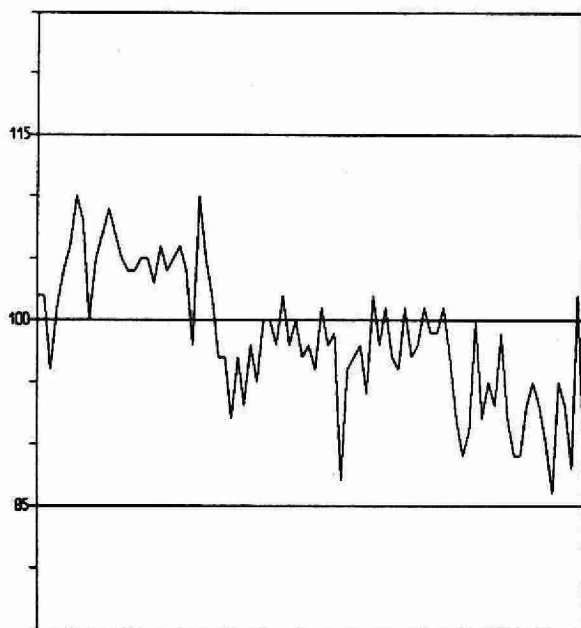
ALUMINUM, REACTIVE SPECIES (ug/L as AL)
(ALEXCV)
QUALITY CONTROL DATA FROM 16/01/91 TO 27/08/91



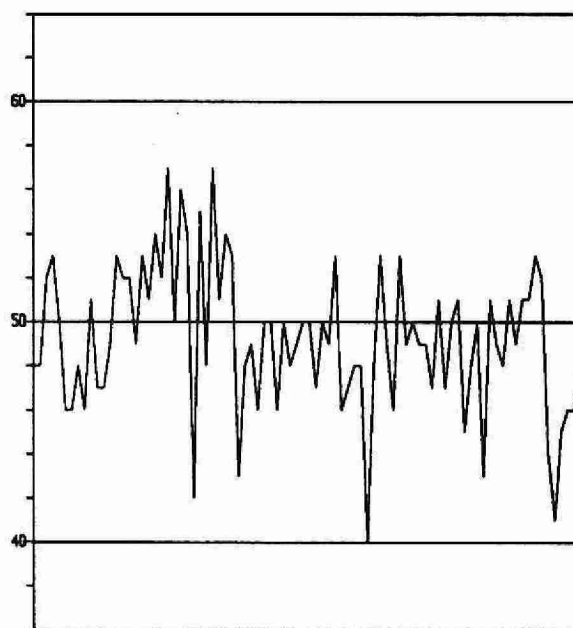
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

ALUMINUM, REACTIVE SPECIES (ALNDCV)

QUALITY CONTROL DATA FROM 16/01/91 TO 20/12/91

Lab: Dorset

Analytical Range: - to 1000 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	86	750.0	751.2	1.2	6.61
B :	86	250.0	247.8	-2.2	3.75
A+B :	86	1000.0	999.0	-1.0	9.06
A-B :	86	500.0	503.4	3.4	5.78
C :	86	75.0	74.6	-0.4	3.58
D :	86	25.0	24.9	-0.1	3.01
C+D :	86	100.0	99.5	-0.5	5.72
C-D :	86	50.0	49.7	-0.3	3.33

s.d.(AB) S(between runs): 5.38 Sw(within run): 4.09 S/Sw: 1.31

s.d.(AB) S(between runs): 3.31 Sw(within run): 2.35 S/Sw: 1.41

On any given day the calibration is accepted if the values obtained lie within the ranges:

963	-	1037	for	A+B
475	-	525	for	A-B
85	-	115	for	C+D
40	-	60	for	C-D

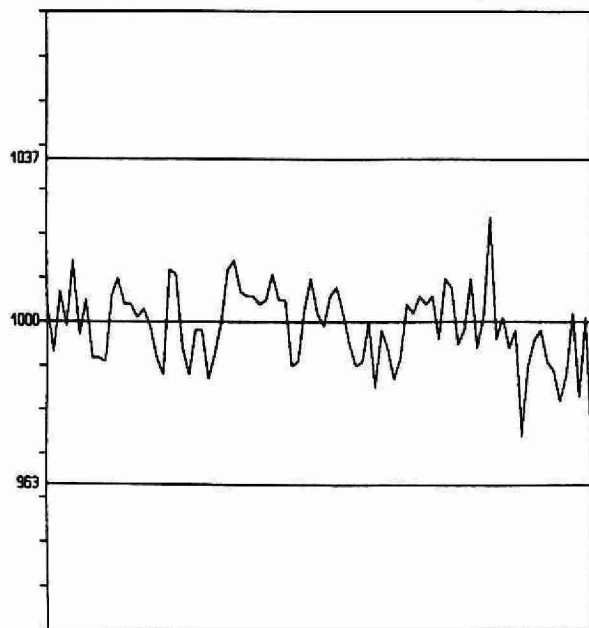
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
139	0	-	100	2.31	5.2
65	100	-	250	5.22	8.7
41	250	-	500	10.22	3.0
8	500	-	1000	11.38	3.8
253	Overall			4.15	

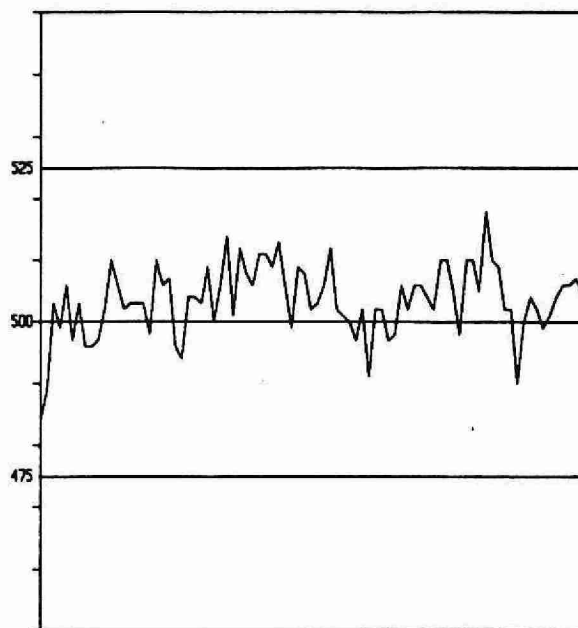
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	86	0.209	0.856

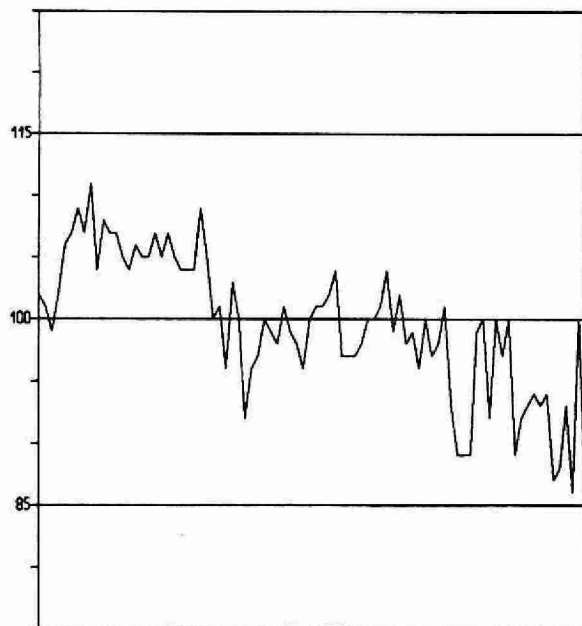
ALUMINUM, REACTIVE SPECIES (ug/L as Al)
(ALDNCV)
QUALITY CONTROL DATA FROM 16/01/91 TO 20/12/91



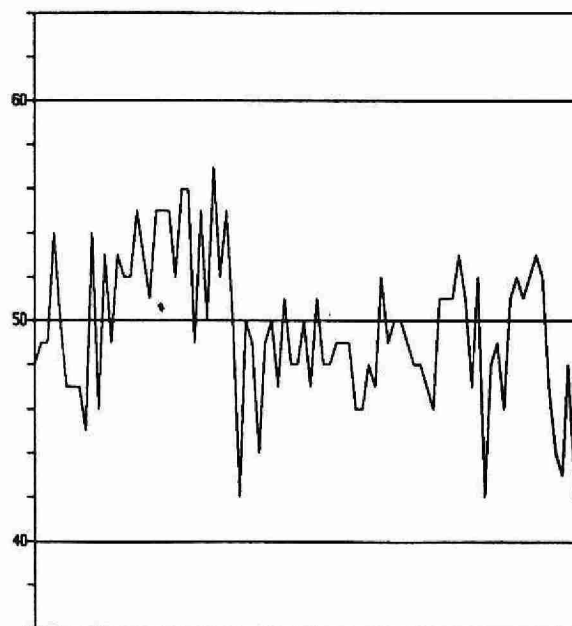
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** ALUMINUM, SODIUM PYROPHOSPHATE EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEPY	Units	: % by wt.Al
Work Station Code	: DOMETALX	Unit Code	: 070813
Method Code	: 703AA5	Supervisor	: A. Neary
Method Reference No.	: E3030A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500 um (35 mesh)

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM, SODIUM PYROPHOSPHATE EXTRACTABLE

QUALITY CONTROL DATA FROM 15/01/91 TO 17/01/91

Lab: Dorset Soils

Analytical Range: - to 0.5 % by wt. Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	0.375	0.373	-0.002	0.0115
B :	3	0.125	0.133	0.008	0.0058
A+B :	3	0.500	0.507	0.007	0.0153
A-B :	3	0.250	0.240	-0.010	0.0100

s.d.(AB) S(between runs): 0.009 Sw(within run): 0.007 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.46 - 0.54 for A+B
0.23 - 0.27 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.320	0.017
R2 :	3	0.463	0.015
R3 :	3	0.290	0.010

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.10	N.A.	N.A.
0	0.10 - 0.25	N.A.	N.A.
8	0.25 - 0.50	0.033	6.07
9	Overall	0.031	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.000	0.000

*** ALUMINUM, SOLUBLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALECA	Units (dried)	: ug/g as Al
Work Station Code	: DOSOLAL	Unit Code	: 073813
Method Code	: 3144A5	Supervisor	: A. Neary
Method Reference No.	: E3040A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g (dry <2 mm)
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 10 g sample plus 20 mL 0.01 M calcium chloride is agitated for 5 minutes, centrifuged and filtered. The filtration is analyzed for Al by AAS at 309.3 nm using an NO₂-acetylene flame. Approximate absorbance: 0.1 at the full scale level

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types plus two solution controls at 10% and 30% of full scale and two method blanks.
Drift : BL plus 1 standard (100%) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM, SOLUBLE

QUALITY CONTROL DATA FROM 01/02/91 TO 04/02/91

Lab: Dorset Soils

Analytical Range: - to 40.0 ug/g as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	30.0	29.87	-0.13	1.662
B :	3	10.0	10.10	0.10	0.656
A+B :	3	40.0	39.97	-0.03	1.457
A-B :	3	20.0	19.77	-0.23	2.065

s.d.(AB) S(between runs): 1.26 Sw(within run): 1.46 S/Sw: 0.87

On any given day the calibration is accepted if the values obtained lie within the ranges:

35.2 - 44.8 for A+B
16.8 - 23.2 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	3.67	0.551
R2 :	3	13.43	1.655
R3 :	3	34.03	2.419

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.0 - 1.0	N.A.	N.A.
3	1.0 - 10.0	0.422	8.39
6	10.0 - 40.0	1.442	6.73
9	Overall	0.974	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.0000	0.000

*** ALUMINUM, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 06/09/83
LIS Test Name Code	: ALUT	Units	: ug/L as Al
Work Station Code	: DOAAS	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: A. Neary
Method Reference No.	: E3299A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Groundwaters		

SAMPLING:

Quantity Required : 1 mL
Container : 15 mL Polystyrene Tube, capped, acidified to 0.25% with HNO₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 309.3 nm.
Approximate absorbance: .5 at the full scale level

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

BL plus 5 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

ALUMINUM, TOTAL

QUALITY CONTROL DATA FROM 08/01/91 TO 31/12/91

Lab: Dorset

Analytical Range: - to 200 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	73	140.0	139.93	-0.07	6.06
B :	73	70.0	71.53	1.53	3.86
A+B :	73	210.0	211.47	1.47	7.77
A-B :	73	70.0	68.40	-1.60	6.53
C :	73	35.0	35.55	0.55	3.25
D :	73	7.0	7.07	0.07	1.24
C+D :	73	42.0	42.62	0.62	3.93
C-D :	73	28.0	28.48	0.48	2.96

s.d.(AB) S(between runs): 5.08 Sw(within run): 4.62 S/Sw: 1.10

s.d.(AB) S(between runs): 2.46 Sw(within run): 2.10 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

180	-	240	for	A+B
50	-	90	for	A-B
27	-	57	for	C+D
18	-	38	for	C-D

DUPLICATES:

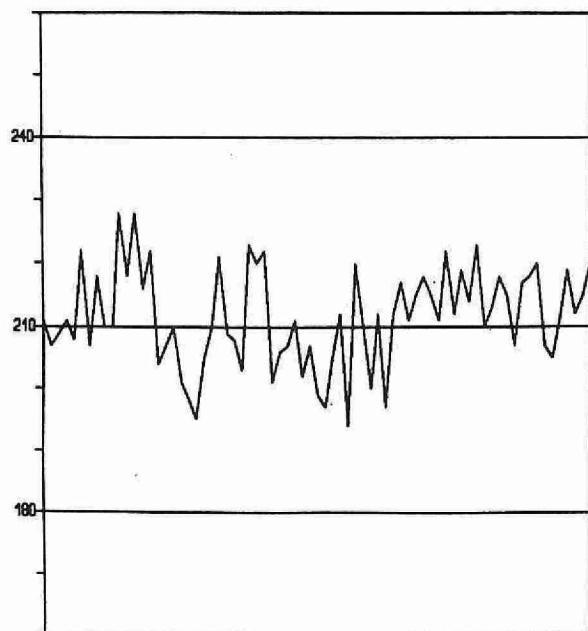
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
47	0.0	-	40.0	3.01	11.5
55	40.0	-	100.0	4.13	6.0
49	100.0	-	200.0	8.71	5.7
151	Overall			5.11	7.0

OTHER CHECKS:

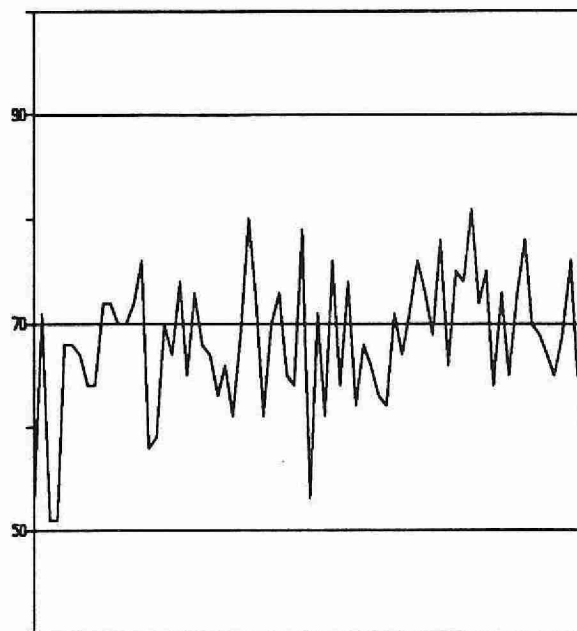
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	73	0.00	0.00

ALUMINUM, TOTAL (ug/L as Al)

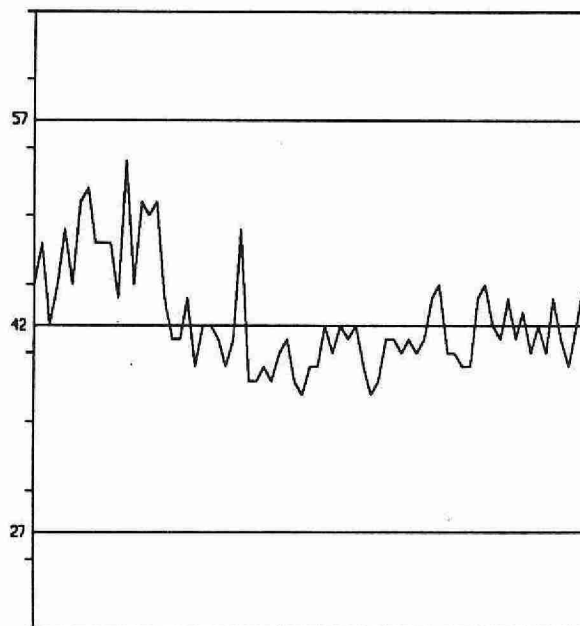
QUALITY CONTROL DATA FROM 08/01/91 TO 31/12/91



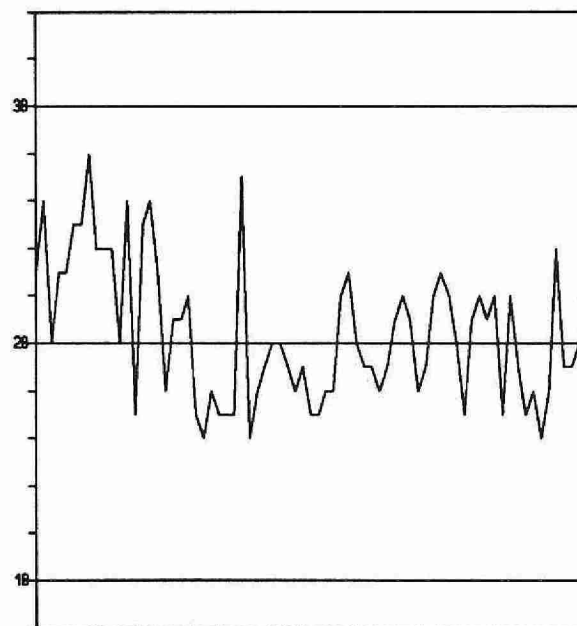
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** CADMIUM, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/11/84
LIS Test Name Code	: CDUT	Units	: ug/L as Cd
Work Station Code	: DOTRACE	Unit Code	: 063848
Method Code	: 005AF2	Supervisor	: A. Neary
Method Reference No.	: E3305A		
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 5 mL
Container : Glass or plastic, capped, acidified to 0.25% with HNO₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 228.8 nm.
Approximate absorbance: 0.400 at the full scale level

INSTRUMENTATION:

Varian graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 5 standards.

CONTROLS:

Calibration : 1 NRC sample, 3 duplicates
Drift : 1 blank plus 1 standard

NOTES:

Work station was formerly DOAAS and changed in August 1991 to DOTRACE.

CADMIUM, TOTAL

QUALITY CONTROL DATA FROM 22/08/91 TO 04/12/91

Lab: Dorset Soils

QUALITY CONTROL:

	Number of Data	Av. Conc'n Measured	Standard(1) Deviation
NRC :	12	0.030416	0.001311

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
30	0.00 - 1.00	0.005	18.50
0	1.00 - 2.50	N.A.	N.A.
0	2.50 - 5.00	N.A.	N.A.
30	Overall	0.005	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	9	0.0373	0.0121

NOTES:

A new series of low level calibration control standards from EPA ampoules is currently in place and the data are currently being collected. Thus, only data from NRC analysis are provided for this report.

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAA400	Unit Code	: 064820
Method Code:	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

CALCIUM

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91

Lab: Atomic Absorption

Analytical Range: - to 2.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	53	1.20	1.2031	0.0031	0.0125
B :	53	0.20	0.2002	0.0002	0.0057
A+B :	53	1.40	1.4033	0.0033	0.0132
A-B :	53	1.00	1.0028	0.0028	0.0143

s.d.(AB) S(between runs): 0.0097 Sw(within run): 0.0101 S/Sw: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.31 - 1.49 for A+B
0.94 - 1.06 for A-B

DUPLICATES:

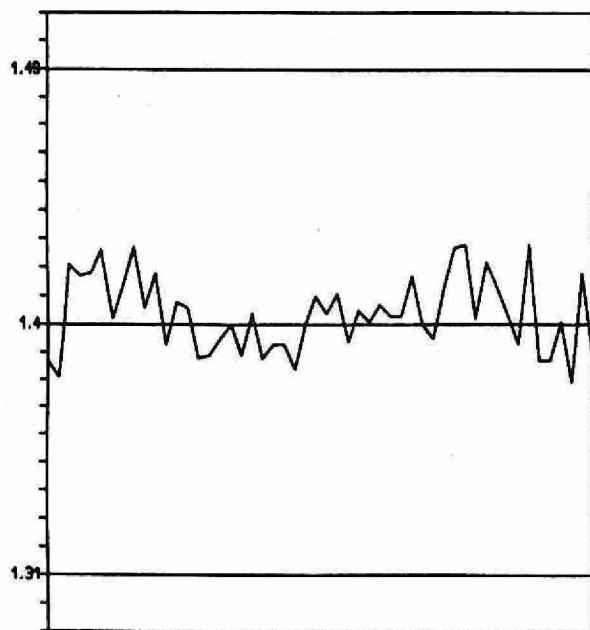
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
77	0.00	-	0.20	0.003	10.4
49	0.20	-	0.50	0.006	1.9
16	0.50	-	1.00	0.007	0.8
9	1.00	-	2.00	0.012	2.9
151	Overall			0.005	

OTHER CHECKS:

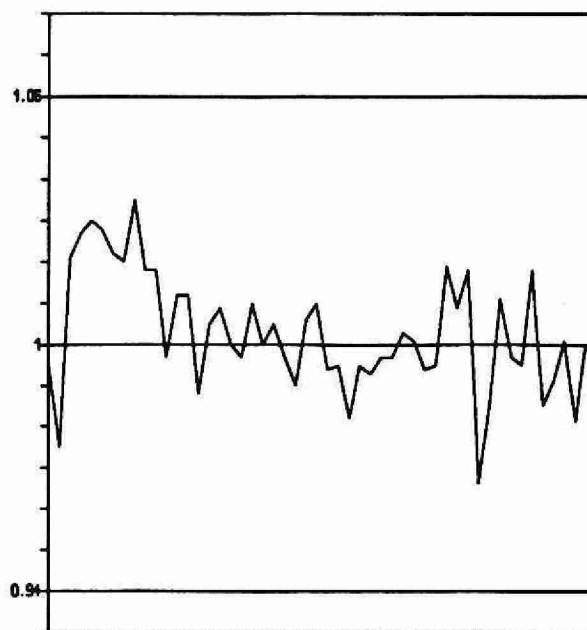
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	53	-0.0018	0.0044

CALCIUM (mg/L as Ca)

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

CALCIUM

QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91

Lab: Atomic Absorption

Analytical Range: - to 8.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	6.4	6.395	-0.005	0.0444
B :	118	1.6	1.611	0.011	0.0204
A+B :	118	8.0	8.006	0.006	0.0580
A-B :	118	4.8	4.784	-0.016	0.0376
C :	118	1.6	1.611	0.011	0.0204
D :	118	0.4	0.409	0.009	0.0103
C+D :	118	2.0	2.020	0.020	0.0282
C-D :	118	1.2	1.202	0.002	0.0160

s.d.(AB) S(between runs): 0.035 Sw(within run): 0.027 S/Sw: 1.3

s.d.(CD) S(between runs): 0.016 Sw(within run): 0.011 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

7.64	-	8.36	for	A+B
4.65	-	4.95	for	A-B
1.64	-	2.36	for	C+D
1.05	-	1.35	for	C-D

DUPLICATES:

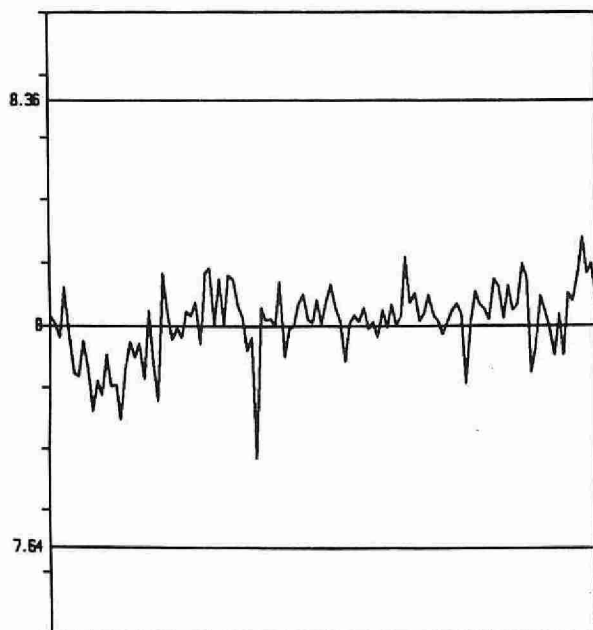
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
39	0.00 - 1.60	0.0131	1.6
140	1.60 - 3.00	0.0301	3.9
151	3.00 - 8.00	0.0406	3.0
330	Overall	0.0332	

OTHER CHECKS:

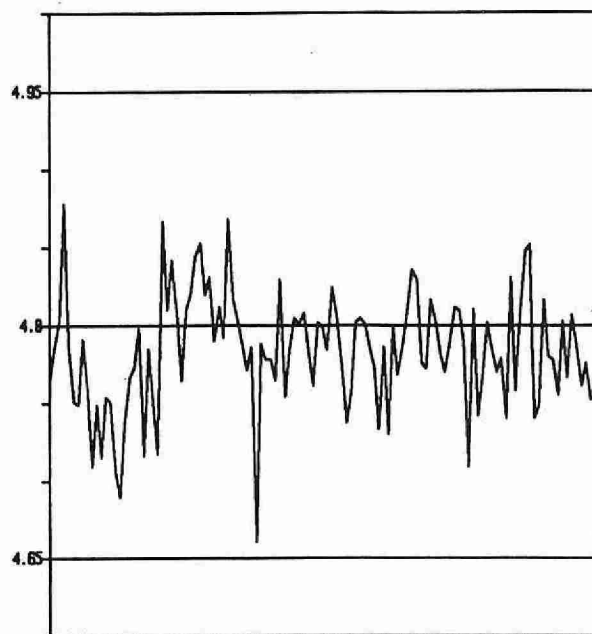
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	0.0007	0.009

CALCIUM (mg/L as Ca)

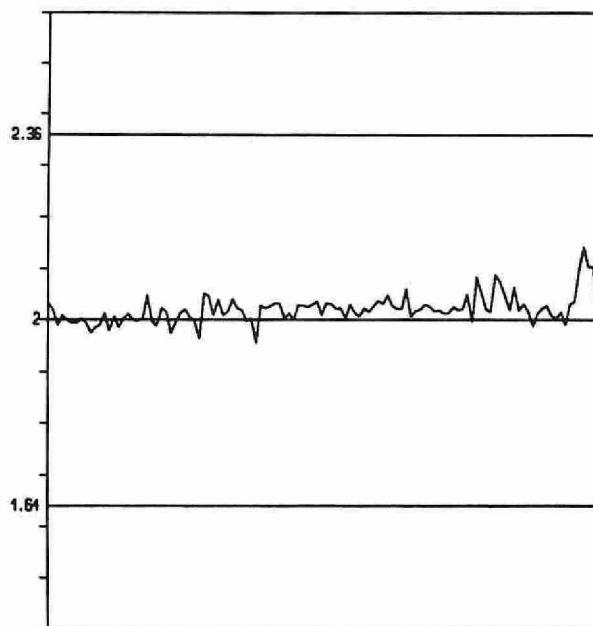
QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91



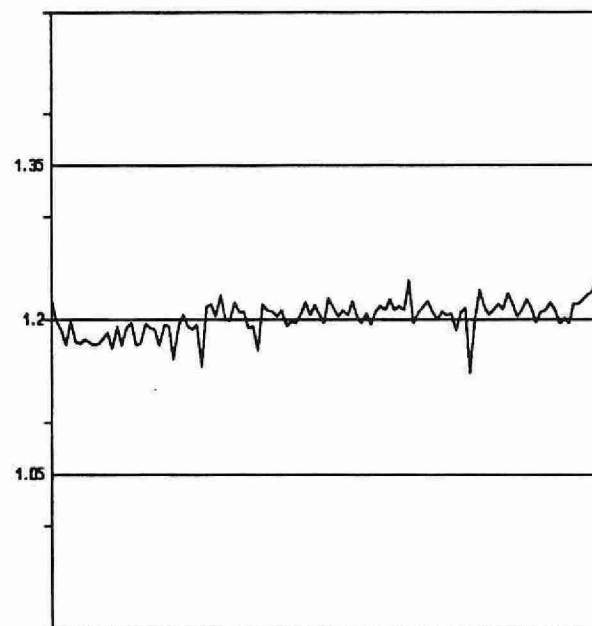
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: RMAAS	Unit Code	: 064820
Method Code	: 0901A1	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.14 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

CALCIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91

Lab: Atomic Absorption

Analytical Range: - to 40.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	76	32.0	31.62	-0.38	0.3961
B :	76	8.0	7.87	-0.13	0.1099
A+B :	76	40.0	39.49	-0.51	0.4410
A-B :	76	24.0	23.75	-0.25	0.3788
C :	76	8.0	7.87	-0.13	0.1099
D :	76	2.0	1.97	-0.03	0.0517
C+D :	76	10.0	9.84	-0.16	0.1352
C-D :	76	6.0	5.89	-0.11	0.1060

s.d.(AB) S(between runs): 0.29 Sw(within run): 0.27 S/Sw: 1.1

s.d.(CD) S(between runs): 0.09 Sw(within run): 0.07 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.35	-	41.65	for	A+B
22.90	-	25.10	for	A-B
9.25	-	10.75	for	C+D
5.50	-	6.50	for	C-D

DUPLICATES:

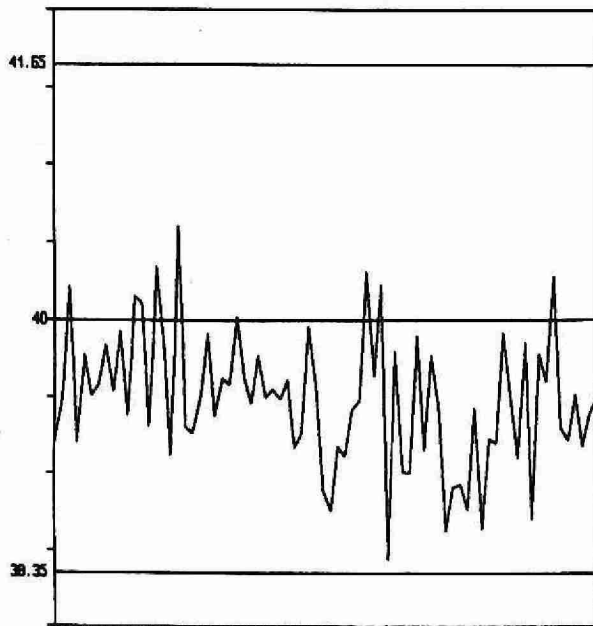
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
29	0.00	-	2.00	0.0587	4.0
58	2.00	-	5.00	0.0562	3.7
20	5.00	-	20.00	0.1653	1.4
41	20.00	-	40.00	0.4849	1.5
148	Overall			0.1671	

OTHER CHECKS:

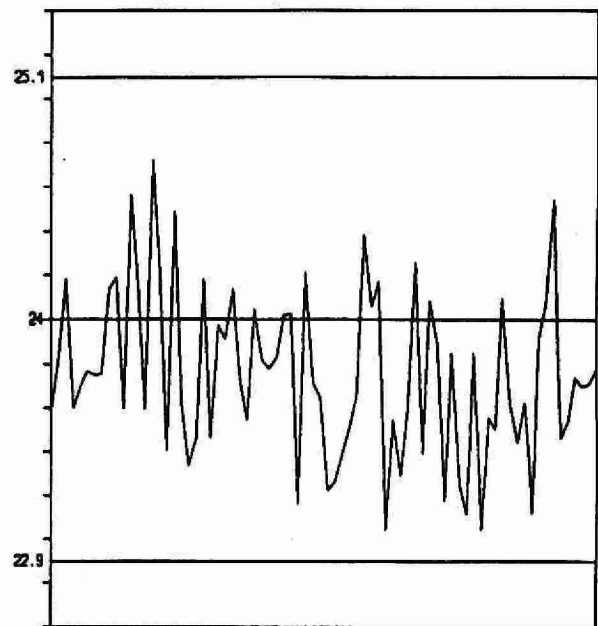
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	76	0.0081	0.0434

CALCIUM (mg/L as Ca)

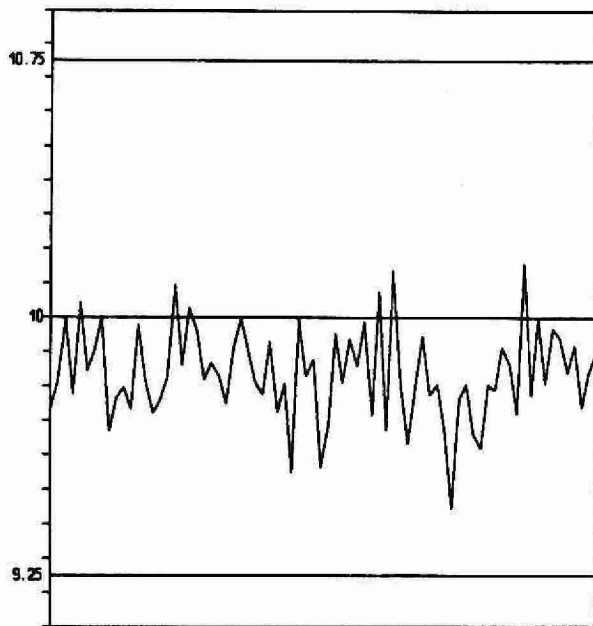
QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91



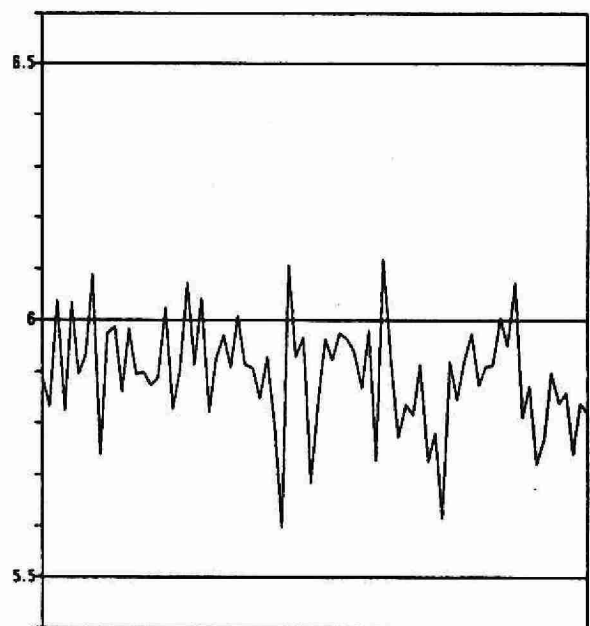
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 1.17 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards e.g. QCA

Drift : BL every 10 samples; 2 standards every 20 samples

CALCIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 20/12/91

Lab: Atomic Absorption

Analytical Range: - to 200.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	126	160.0	159.34	-0.66	2.590
B :	126	40.0	39.97	-0.03	0.869
A+B :	126	200.0	199.31	-0.69	2.942
A-B :	126	120.0	119.37	-0.63	2.504
C :	126	40.0	39.97	-0.03	0.869
D :	126	10.0	9.96	-0.04	0.428
C+D :	126	50.0	49.93	-0.07	1.056
C-D :	126	30.0	30.01	0.01	0.872

s.d.(AB) S(between runs): 1.93 Sw(within run): 1.77 S/Sw: 1.09

s.d.(CD) S(between runs): 0.69 Sw(within run): 0.62 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

190	-	210	for	A+B
113	-	127	for	A-B
44.5	-	54.5	for	C+D
27.0	-	33.0	for	C-D

DUPLICATES:

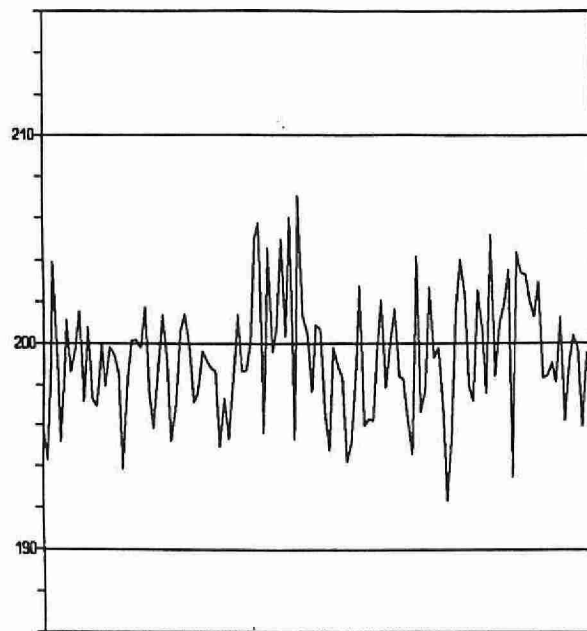
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
37	0.00 - 10.00	0.3058	5.6
24	10.00 - 20.00	0.3369	2.3
98	20.00 - 50.00	0.6451	6.5
117	50.00 - 100.00	1.4617	2.2
66	100.00 - 200.00	2.6646	2.0
342	Overall	1.1688	

OTHER CHECKS:

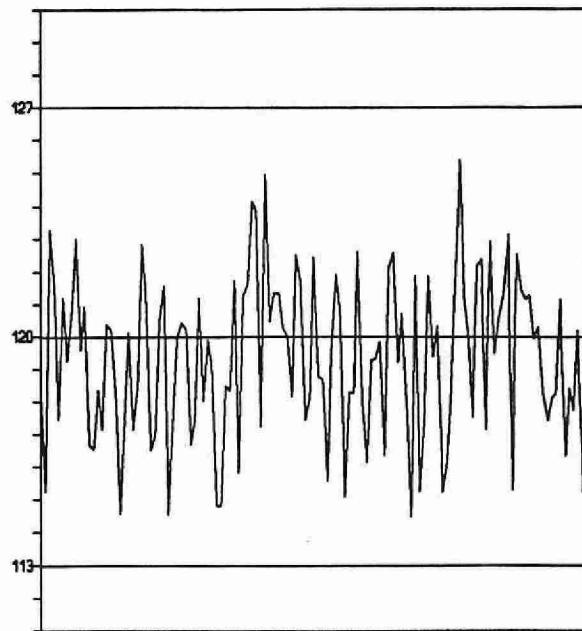
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	125	-0.0667	0.9673

CALCIUM (mg/L as Ca)

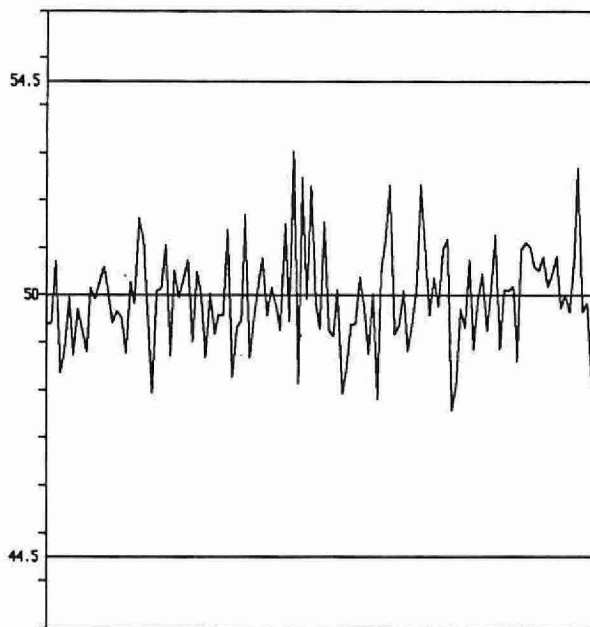
QUALITY CONTROL DATA FROM 02/01/91 TO 20/12/91



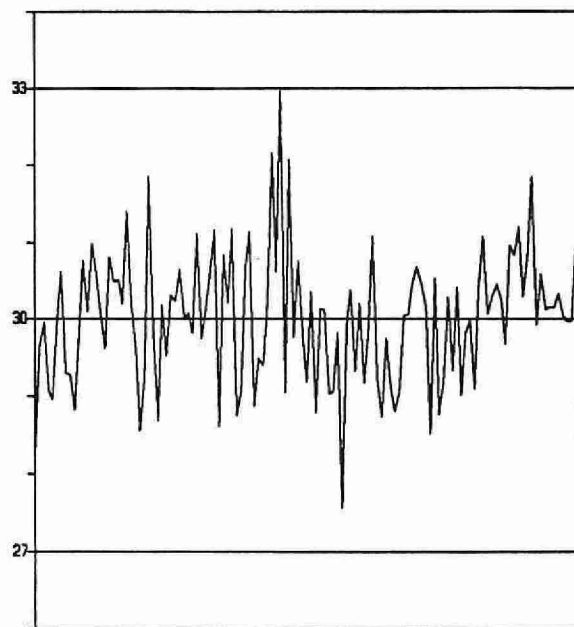
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CALCIUM, EXCHANGEABLE CATIONS *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CAESC	Units	: meq/100 g
Work Station Code	: DOLOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Ca by AAS at 422.7 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level.

Aluminum, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

CALCIUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 07/01/91 TO 14/01/91

Lab: Dorset Soils

Analytical Range: - to 5.0 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	3.75	3.740	-0.010	0.0779
B :	4	1.25	1.248	-0.002	0.0670
A+B :	4	5.00	4.988	-0.012	0.1195
A-B :	4	2.50	2.493	0.007	0.0826

s.d.(AB) S(between runs): 0.073 Sw(within run): 0.058 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.63 - 5.37 for A+B
2.25 - 2.75 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	2.968	0.154
R2 :	4	1.693	0.073
R3 :	4	0.513	0.084

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.0 - 1.0	7.0157	24.0
0	1.0 - 2.5	N.A.	N.A.
4	2.5 - 5.0	0.062	1.59
11	Overall	0.033	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	4	0.0000	0.000

***** CARBON, DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 03/06/80
LIS Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: DODIC	Unit Code	: 064806
Method Code	: 1127C2	Supervisor	: A. Neary
Method Reference No.	: E3028A		
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 9 standards daily

CONTROLS:

Calibration : LTB plus 4 standards, e.g. QCA, QCB, QCC, QCD
Drift : BL every 10 samples; BL plus 1 check standard every 20 samples

NOTES:

As concentrations of calibration control solutions slowly change with time at these low concentrations, calibration control ranges are based on long term measured averages rather than expected concentrations. This method was changed to incorporate DCI in Jan. 1989.

CARBON, DISSOLVED INORGANIC

QUALITY CONTROL DATA FROM 04/01/91 TO 13/12/91

Lab: Dorset

Analytical Range: - to 10.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	104	7.50	7.53	0.03	0.171
B :	104	2.25	2.20	-0.05	0.091
A+B :	104	9.75	9.73	-0.02	0.230
A-B :	104	5.25	5.33	0.08	0.149
C :	104	1.50	1.45	-0.05	0.047
D :	104	0.50	0.499	-0.001	0.041
C+D :	104	2.00	1.95	-0.05	0.078
C-D :	104	1.00	0.96	-0.04	0.040

s.d.(AB) S(between runs): 0.14 Sw(within run): 0.11 S/Sw: 1.3

s.d.(AB) S(between runs): 0.04 Sw(within run): 0.03 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.15	-	10.35	for	A+B
4.85	-	5.65	for	A-B
1.70	-	2.30	for	C+D
0.80	-	1.20	for	C-D

DUPLICATES:

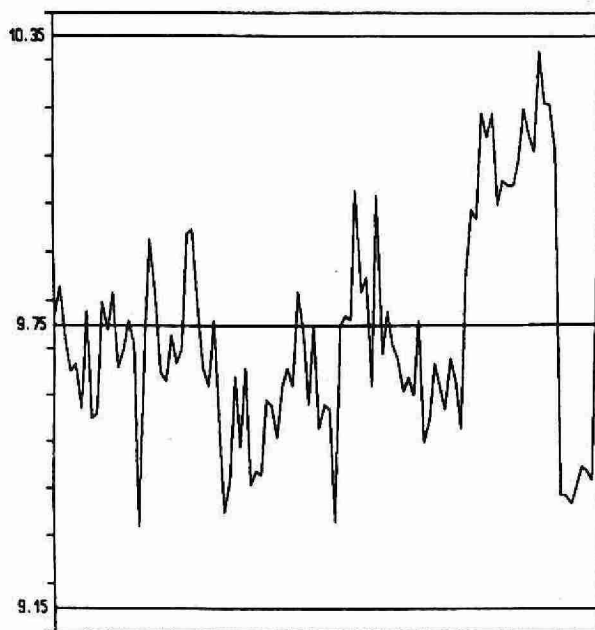
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
24	0.00	-	0.50	0.013	3.4
29	0.50	-	1.00	0.028	3.2
108	1.00	-	2.00	0.042	3.9
118	2.00	-	5.00	0.083	2.9
27	5.00	-	10.00	0.235	3.1
306	Overall			0.064	

OTHER CHECKS:

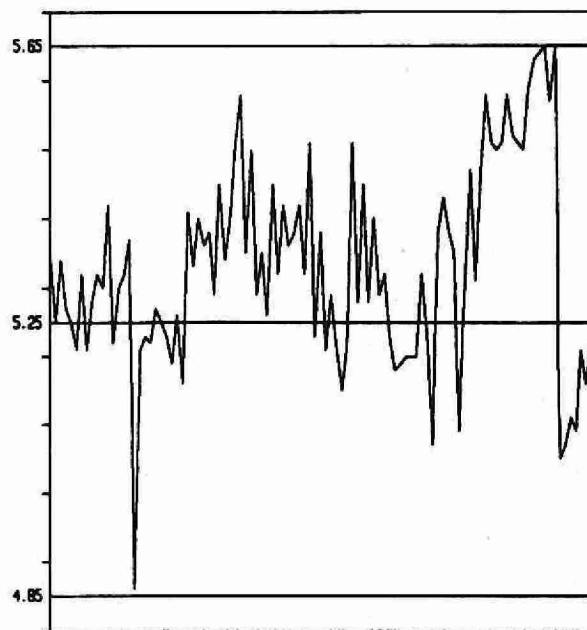
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	104	0.191	0.052

CARBON, DISSOLVED INORGANIC (mg/L as C)

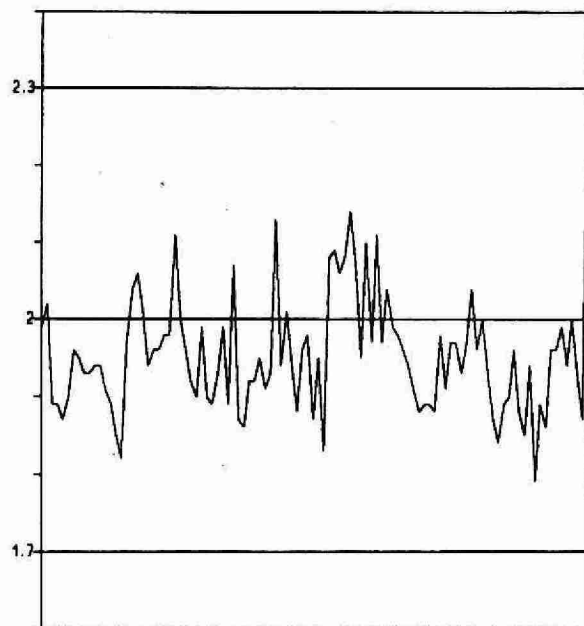
QUALITY CONTROL DATA FROM 04/01/91 TO 13/12/91



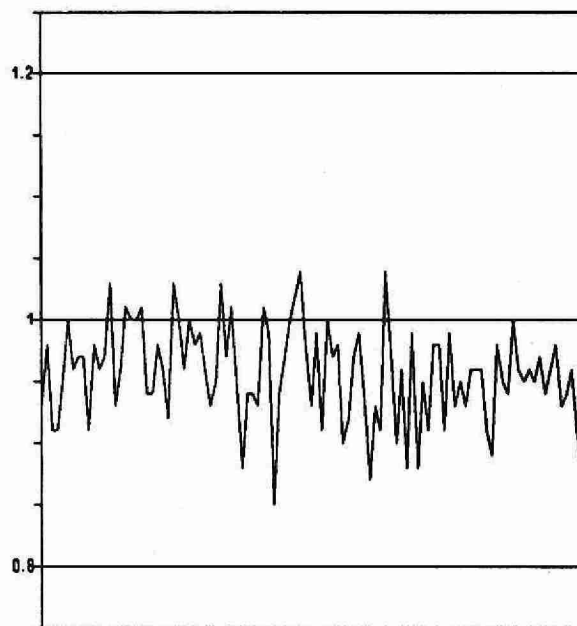
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CARBON, DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
Lis Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3178A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

Dissolved organic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

CARBON, DISSOLVED INORGANIC

QUALITY CONTROL DATA FROM 04/01/91 TO 20/12/91

Lab: Colourimetry

Analytical Range: - to 40.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	173	32	31.91	-0.09	0.670
B :	173	8	8.02	0.02	0.311
A+B :	173	40	39.94	-0.06	0.913
A-B :	173	24	23.89	-0.11	0.508
C :	173	8	8.02	0.02	0.311
D :	173	2	1.95	-0.05	0.174
C+D :	173	10	9.97	-0.03	0.450
C-D :	173	6	6.07	0.07	0.226

s.d.(AB) S(between runs): 0.52 Sw(within run): 0.25 S/Sw: 1.5

s.d.(CD) S(between runs): 0.25 Sw(within run): 0.16 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

37.80	-	42.20	for	A+B
22.50	-	25.50	for	A-B
8.90	-	11.10	for	C+D
5.30	-	6.70	for	C-D

DUPLICATES:

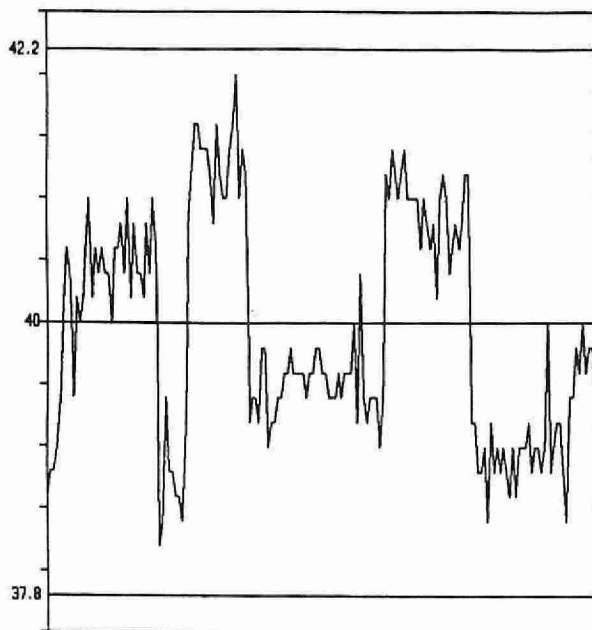
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
95	0.0	-	1.0	0.195	63.4
42	1.0	-	2.0	0.348	25.1
130	2.0	-	20.0	0.380	4.7
112	20.0	-	40.0	0.366	1.6
379	Overall			0.318	

OTHER CHECKS:

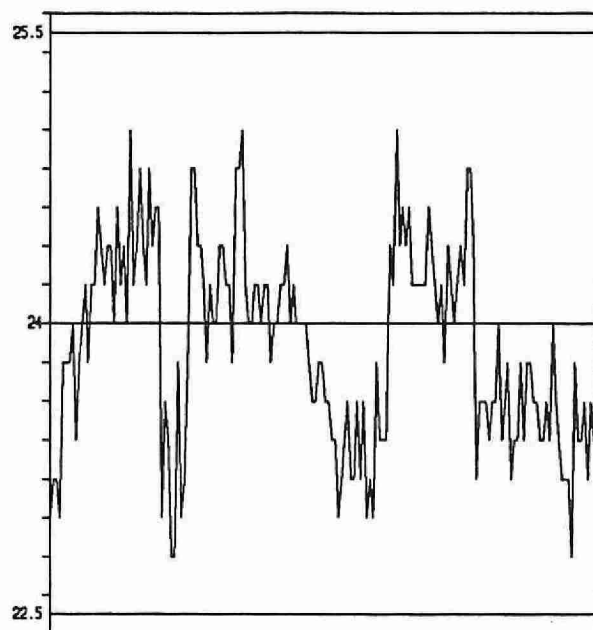
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	173	-0.025	0.158

CARBON, DISSOLVED INORGANIC (mg/L as C)

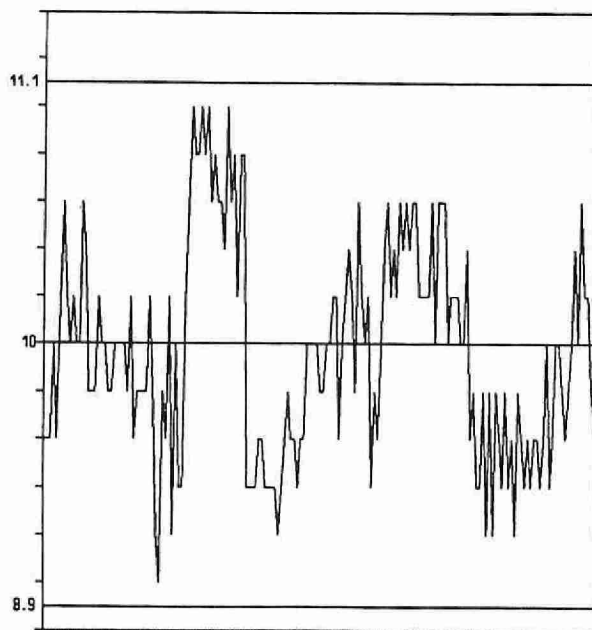
QUALITY CONTROL DATA FROM 04/01/91 TO 20/12/91



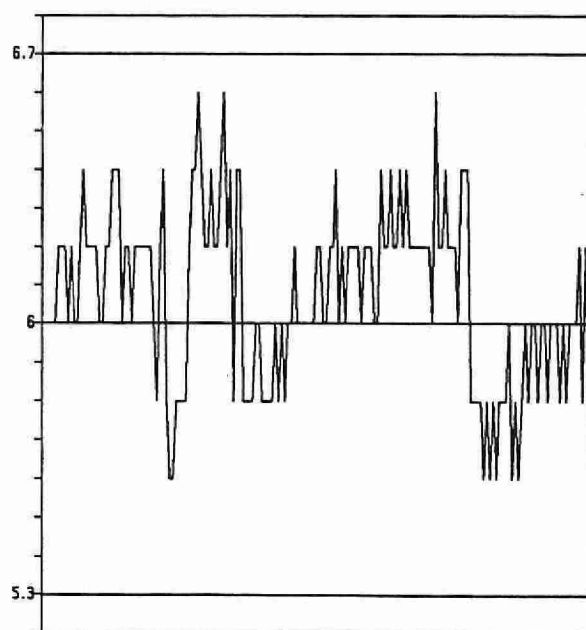
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CARBON, DISSOLVED ORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: DOC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3178A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas (500 mL/min) to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light (UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample. Approximate absorbance: 0.3 at the full scale level. Dissolved inorganic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO₂-free) supplies with flow controls, dialysis unit, UV digester. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

CARBON, DISSOLVED ORGANIC

QUALITY CONTROL DATA FROM 02/01/91 TO 27/12/91

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	182	16.0	15.90	-0.10	0.156
B :	182	4.0	3.92	-0.08	0.092
A+B :	182	20.0	19.82	-0.12	0.195
A-B :	182	12.0	11.98	-0.02	0.164
C :	182	4.0	3.92	-0.08	0.092
D :	182	1.0	0.997	-0.003	0.075
C+D :	182	5.0	4.92	-0.08	0.143
C-D :	182	3.0	2.96	-0.04	0.087

s.d.(AB) S(between runs): 0.12 Sw(within run): 0.13 S/Sw: 1.1

s.d.(CD) S(between runs): 0.06 Sw(within run): 0.08 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.30	-	20.70	for	A+B
11.50	-	12.50	for	A-B
4.60	-	5.40	for	C+D
2.76	-	3.24	for	C-D

DUPLICATES:

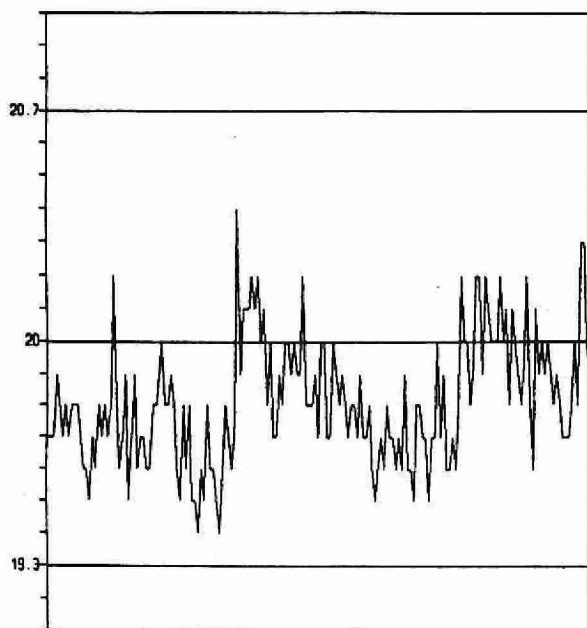
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
216	0.00	-	2.00	0.109	11.0
178	2.00	-	4.00	0.115	5.7
110	4.00	-	10.00	0.146	2.8
23	10.00	-	20.00	0.216	2.0
526	Overall			0.124	

OTHER CHECKS:

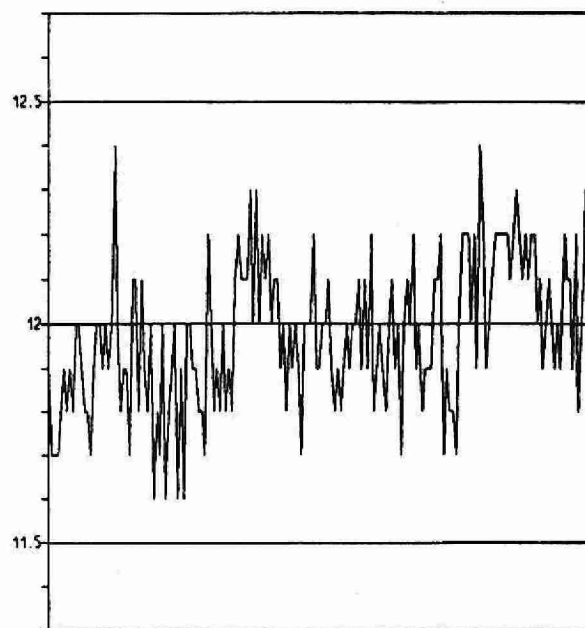
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	182	0.002	0.089

CARBON, DISSOLVED ORGANIC (mg/L as C)

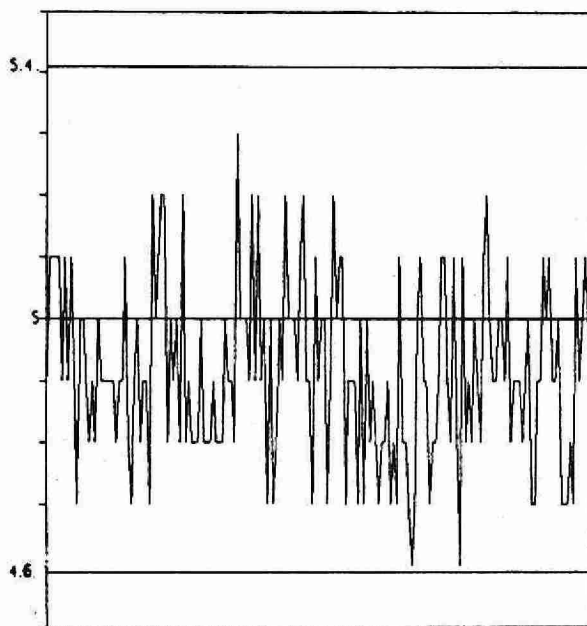
QUALITY CONTROL DATA FROM 02/01/91 TO 27/12/91



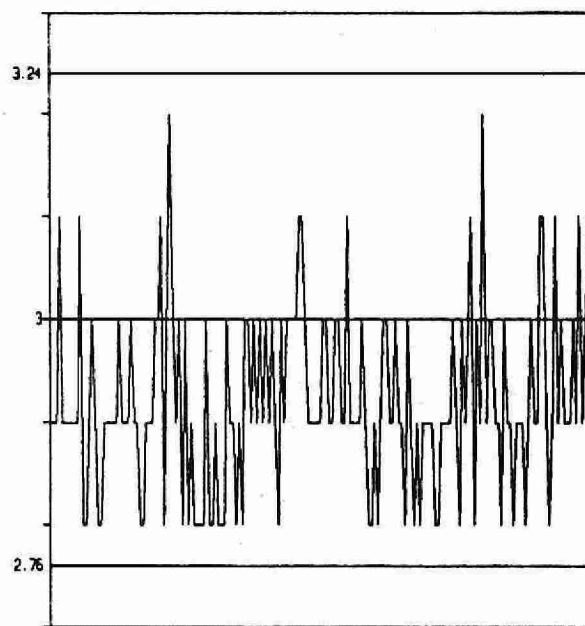
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CARBON, TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/10/80
LIS Test Name Code	: ORGC	Units	: % org. carbon
Work Station Code	: DOOXMAT	Unit Code	: 500806
Method Code	: CALCO1	Supervisor	: A. Neary
Method Reference No.	: E3045A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.1 to 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried and a <2mm subsample ground to <500um.

ANALYTICAL PROCEDURE:

Total carbon is determined by a UIC/Coulometrics combustion furnace with electrometric titration. The percentage by weight of organic carbon in a soil sample is reported and is calculated as the difference between total carbon and inorganic carbon. Inorganic carbon (carbonate C) is determined coulometrically after reaction of the sample in HCl.

INSTRUMENTATION:

-UIC/Coulometrics combustion furnace with coulometric titration of carbon

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CONTROLS:

CaCO₃, plus 2 representative soil samples, 3 duplicates

CARBON, TOTAL

QUALITY CONTROL DATA FROM 13/02/91 TO 15/02/91

Lab: Dorset Soils

Analytical Range: - to 40.0 % organic carbon

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	11.93	0.066
R2 :	3	3.72	0.049
R3 :	3	0.39	0.006

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.0 - 5.0	0.100	3.4
0	5.0 - 10.0	N.A.	N.A.
0	10.0 - 40.0	N.A.	N.A.
7	Overall	0.100	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Blank	3	22.33	5.876

***** CARBON, TOTAL ORGANIC *****

IDENTIFICATION:

Laboratory	: MISA	Method Introduced	: 01/05/89
LIS Test Name Code	: TOC	Units	: mg/L as C
Work Station Code	: WAC	Unit Code	: 064000
Method Code	: SUM001	Supervisor	: J. McBride
Method Reference No.	: E3247A		
Sample Type/Matrix	: Industrial Effluents, and Sewage		

SAMPLING:

Quantity Required	: 500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

If particles in the sample are greater than about 2 mm diameter the sample is homogenized. An aliquot up to 100mL is acidified with sulphuric acid to pH 2.0, then bubbled with nitrogen gas for 10 minutes to remove inorganic carbon. The aliquot is then filtered through a 47 mm diameter glass fibre filter (particle size retention nominally 1.5 μ m). The filtrate is analyzed in an automated system, using ultra-violet/persulphate digestion with infra-red detection of carbon dioxide, to obtain the manually-acidified dissolved organic carbon (ADOC) result. The filter is dried at 103°C overnight and ignited at 1370°C in a Leco carbon analyzer to obtain the non-dissolved organic carbon (NDOC) result. The sum of ADOC and NDOC provides the TOC result.

INSTRUMENTATION:

Astro 2001 carbon analyzer with autosampler
Leco CR12 carbon analyzer

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

A solution of potassium biphthalate is used to calibrate the ADOC analyzer.
Powdered potassium biphthalate standards are used to calibrate the NDOC analyzer.

CONTROLS:

Calibration:	ADOC: 4 QC solutions NDOC: 2 powdered standards
Blanks:	ADOC: Untreated acidified distilled deionized water (LTB) and method blank NDOC: Unused filters and method blank filters are used
Drift:	Standard every 10 crucibles in Leco or every 10 tubes in auto-sampler
Matrix:	Repeat sample diluted 50% further at least every 10 samples Spiked sample at least every 10 samples
Precision:	Duplicate sample at least every 10 samples

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 18/01/91 TO 20/12/91

Lab: MISA

Analytical Range: - to 50 mg/L as C

CALIBRATION CONTROL: ADOC

<u>ADOC</u>	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
A :	54	40.0	40.19	0.19	0.7402
B :	54	10.0	9.54	-0.06	0.4819
A+B :	54	50.0	49.73	-0.27	0.9588
A-B :	54	30.0	30.65	0.65	0.8006

ADOC

s.d.(AB) S(between runs): 0.62

Sw(within run): 0.57

S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

ADOC

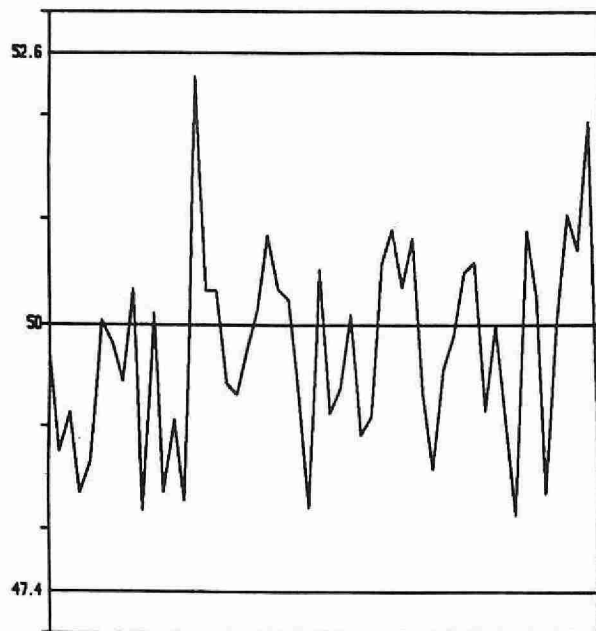
47.4 - 52.6 for A+B
27.9 - 32.1 for A-B

OTHER CHECKS:

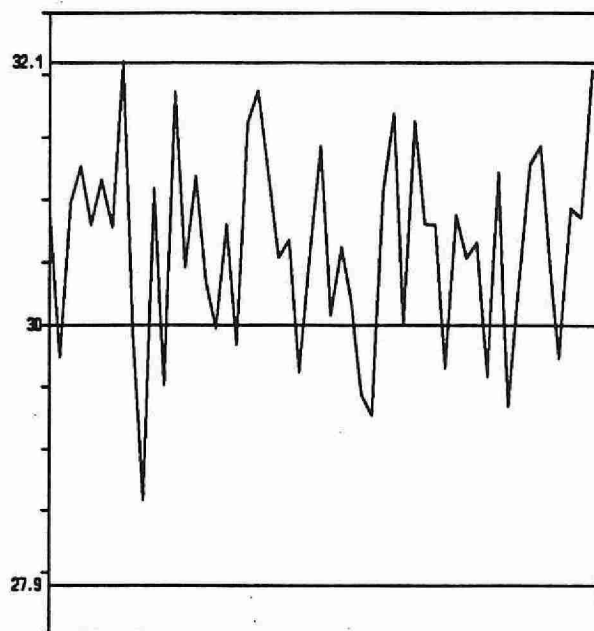
	<u>Number of Data</u>	<u>Data Mean</u>	<u>Standard(1) Deviation</u>
<u>ADOC:</u> MTD BLK	49	0.1825	0.5263
LTB	52	0.0337	0.1740

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 18/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91

Lab: MISA

Analytical Range: - to 10 mg/L as C

CALIBRATION CONTROL: ADOC

<u>ADOC</u>	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
C :	89	8.0	8.07	0.07	0.2260
D :	89	2.0	2.12	0.12	0.1872
C+D :	89	10.0	10.19	0.19	0.3113
C-D :	89	6.0	5.94	-0.06	0.2744

ADOC

s.d.(AB) S(between runs): 0.17

Sw(within run): 0.19

S/Sw: 0.87

On any given day the calibration is accepted if the values obtained lie within the ranges:

ADOC

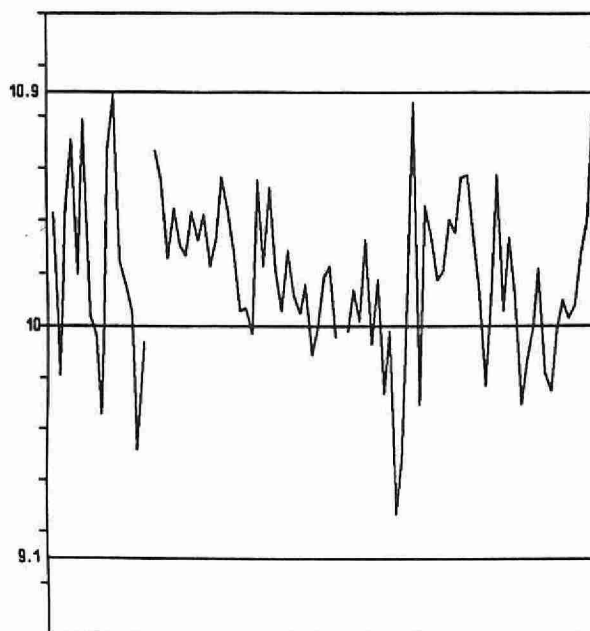
9.1 - 10.9 for C+D
5.4 - 6.6 for C-D

OTHER CHECKS:

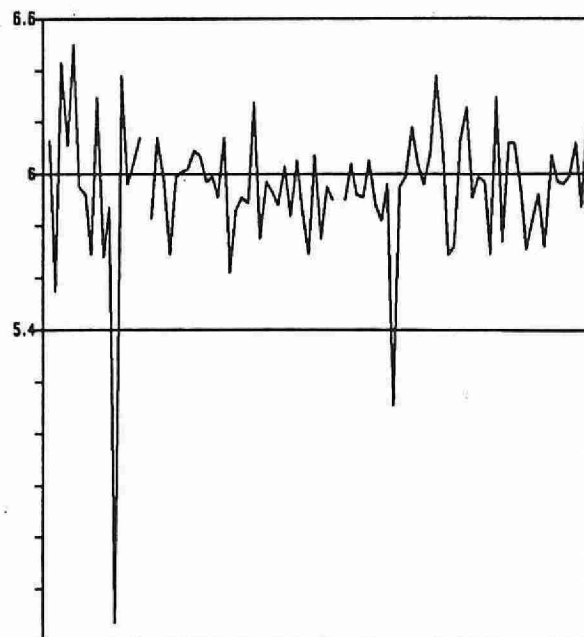
	<u>Number of Data</u>	<u>Data Mean</u>	<u>Standard(1) Deviation</u>
<u>ADOC</u> : LTB	85	0.0762	0.0741

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

_____ CONTROL LIMIT

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 05/01/91 TO 17/12/91

CALIBRATION CONTROL: NDOC

<u>NDOC</u>	<u>Number of Data</u>	<u>Expected Concn</u>	<u>Av. Concn Measured</u>	<u>Av. Bias</u>	<u>Standard(1) Deviation</u>
A :	46	32.0	32.47	0.47	1.3770
B :	46	12.0	11.98	-0.02	0.4900
A+B :	46	44.0	44.45	0.45	1.5842
A-B :	46	20.0	20.49	0.49	1.3277

NDOC

s.d.(AB) S(between runs): 1.03

Sw(within run): 0.94

S/Sw: 1.10

NDOC

40 - 48 for A+B
17 - 23 for A-B

OTHER CHECKS:

	<u>Number of Data</u>	<u>Data Mean</u>	<u>Standard(1) Deviation</u>
<u>NDOC</u> : MTD BLK	46	0.00	0.0
<u>NDOC</u> : BLK	46	0.008	0.054

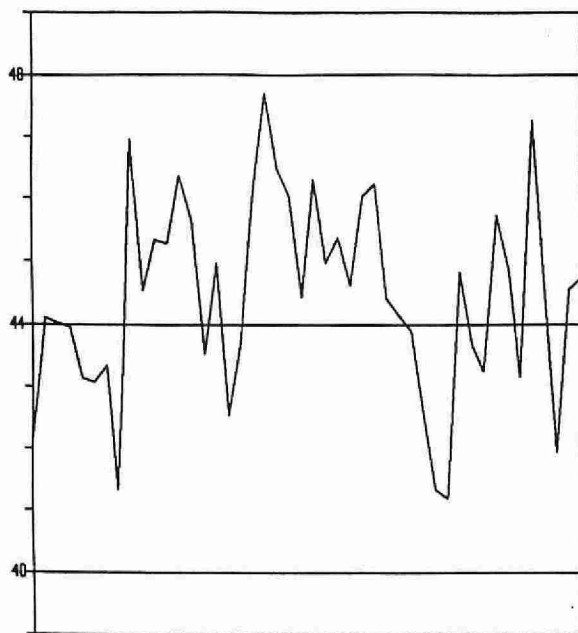
DUPLICATES:

TOC

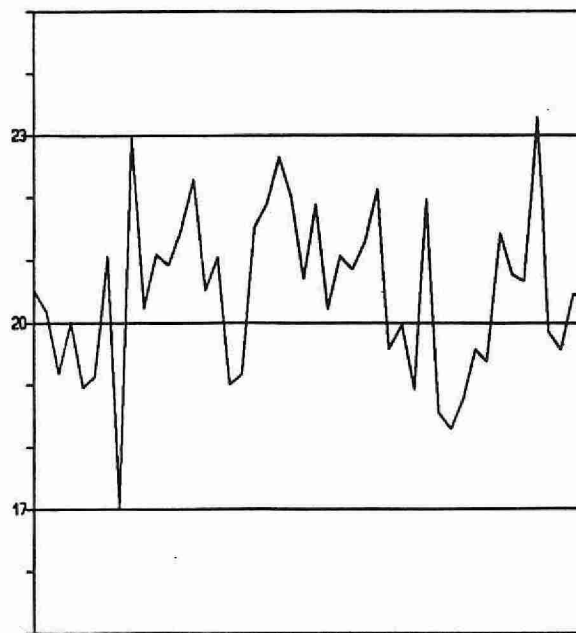
<u>Number of Data Pairs</u>	<u>Sample Concn Span</u>	<u>Mean(2) s.d.</u>	<u>Coefficient of var.(%)</u>
23	0.0 - 5.0	0.4018	15.7
24	5.0 - 25.0	0.5025	4.6
5	25.0 - 100.0	4.4684	4.4
52	Overall	0.5748	

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 05/01/91 TO 17/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** CHLORIDE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/75
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: COCL	Unit Code	: 064960
Method Code	: 004BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3016A		
Sample Type/Matrix	: Rivers (non-APIOS), Lakes (non-APIOS), Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 1.5 cm light path at 470nm.

Data capture, reduction, and processing via a multistage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
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Drift	: BL every 10 samples; standard every 20 samples
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NOTES:

Chloride control limits were exceeded on one occasion. The problem was traced to a contaminated QCB solution. Data for the affected run was released when the problem was shown not to indicate an improper calibration.

CHLORIDE

QUALITY CONTROL DATA FROM 04/01/91 TO 23/12/91

Lab: Colourimetry

Analytical Range: - to 100 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	157	75.0	74.93	-0.07	0.337
B :	157	25.0	25.04	0.04	0.174
A+B :	157	100.0	99.97	-0.03	0.423
A-B :	157	50.0	49.89	-0.11	0.331
C :	157	25.0	25.04	0.04	0.174
D :	157	5.0	4.95	-0.05	0.164
C+D :	157	30.0	29.99	-0.01	0.261
C-D :	157	20.0	20.09	0.09	0.213

s.d.(AB) S(between runs): 0.27 Sw(within run): 0.23 S/Sw: 1.15

s.d.(CD) S(between runs): 0.17 Sw(within run): 0.15 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

98.8	-	101.2	for	A+B
49.2	-	50.8	for	A-B
29.3	-	30.7	for	C+D
19.55	-	20.45	for	C-D

DUPLICATES:

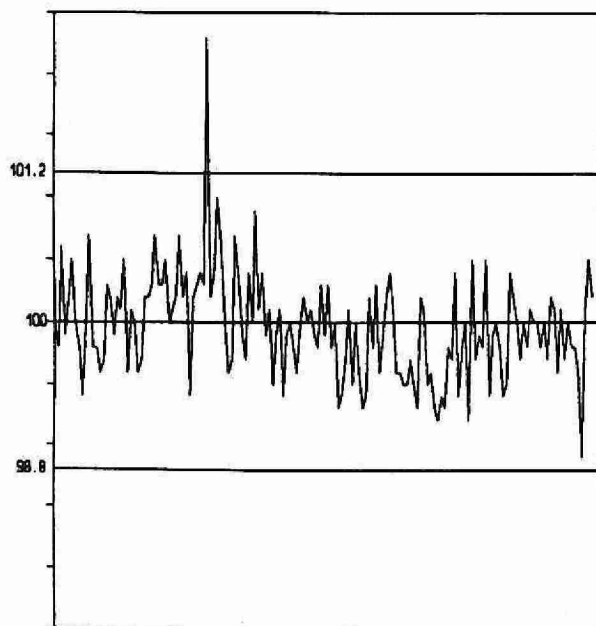
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
143	0.0	-	10.0	0.127	3.24
100	10.0	-	20.0	0.193	2.05
195	20.0	-	100.0	0.364	1.84
438	Overall			0.234	

OTHER CHECKS:

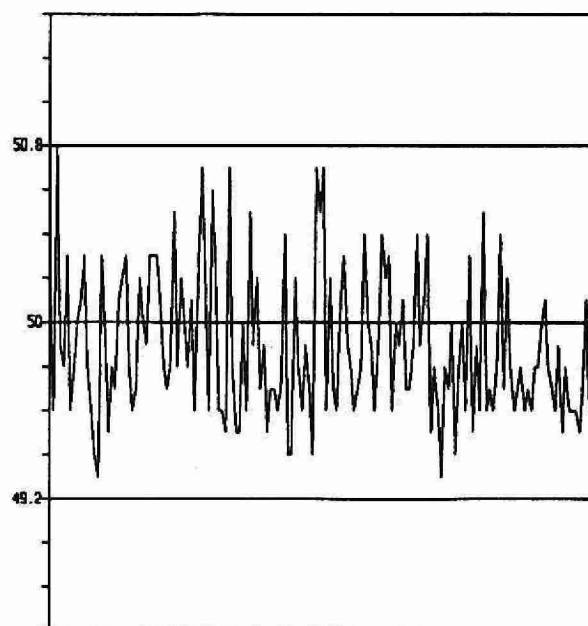
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	157	0.032	0.247

CHLORIDE (mg/L as Cl)

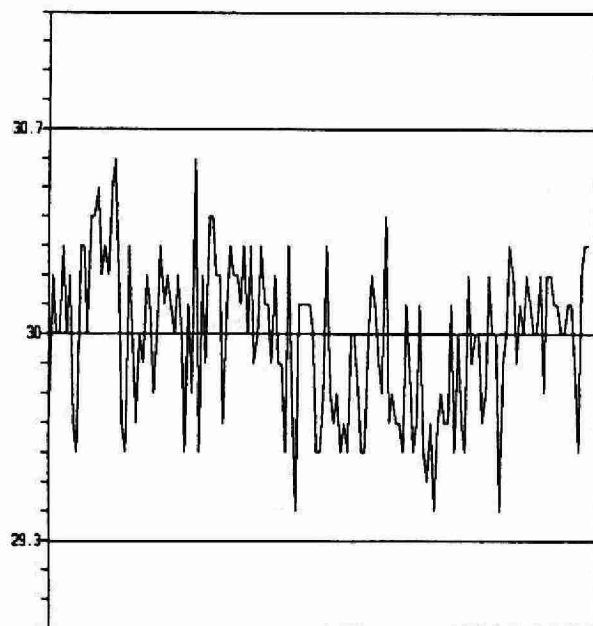
QUALITY CONTROL DATA FROM 04/01/91 TO 23/12/91



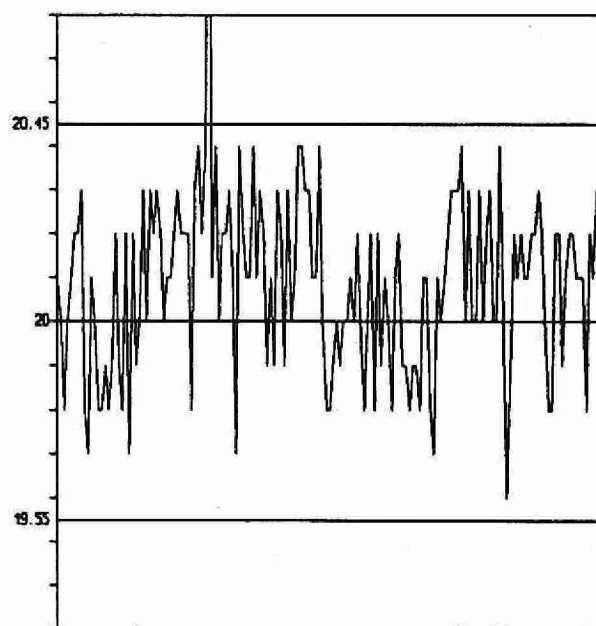
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: PRIC1	Unit Code	: 064960
Method Code	: 005AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards.

Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Two analytical ranges are in operation at this work station, and subsequently, quality control results are provided for each range.

CHLORIDE

QUALITY CONTROL DATA FROM 14/01/91 TO 18/12/91

Lab: Ion Chromatography

Analytical Range: - to 1.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	39	0.8	0.811	0.011	0.013
B :	39	0.2	0.203	0.003	0.010
A+B :	39	1.0	1.014	0.014	0.020
A-B :	39	0.6	0.610	0.010	0.012

s.d.(AB) S(between runs): 0.012 Sw(within run): 0.008 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.95 - 1.05 for A+B
0.57 - 0.63 for A-B

DUPLICATES:

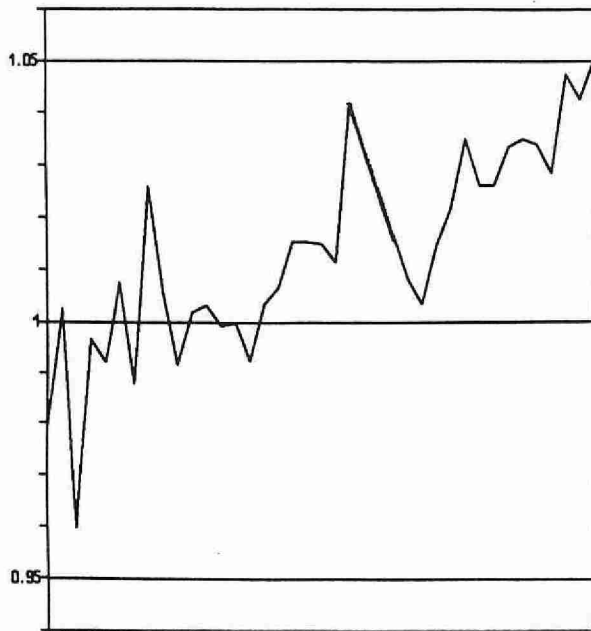
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
27	0.00 - 0.05	0.0021	14.2
26	0.05 - 0.10	0.0060	7.7
52	0.10 - 1.00	0.0075	5.8
104	Overall	0.0058	

OTHER CHECKS:

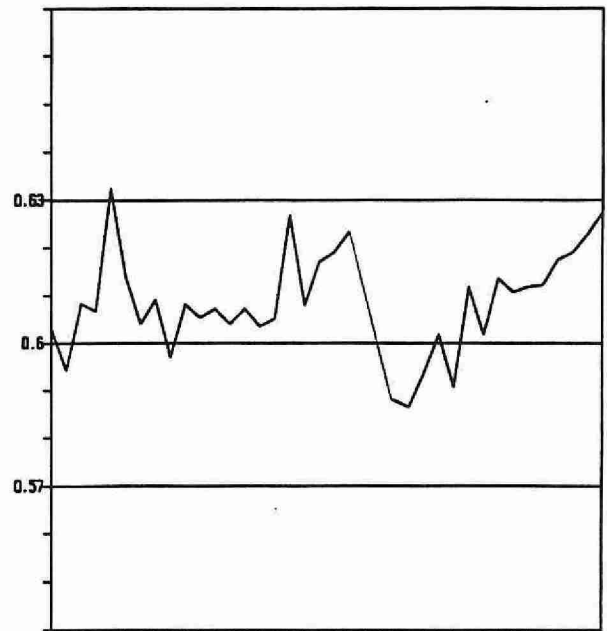
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	39	0.006	0.005

CHLORIDE (mg/L as Cl)

QUALITY CONTROL DATA FROM 14/01/91 TO 18/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

CHLORIDE

QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91

Lab: Ion Chromatography

Analytical Range: - to 2.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	76	1.60	1.598	-0.002	0.0158
B :	76	0.40	0.397	-0.003	0.0101
A+B :	76	2.00	1.995	-0.005	0.0199
A-B :	76	1.20	1.201	0.001	0.0176

s.d.(AB) S(between runs): 0.013 Sw(within run): 0.012 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91 - 2.09 for A+B
1.14 - 1.26 for A-B

DUPLICATES:

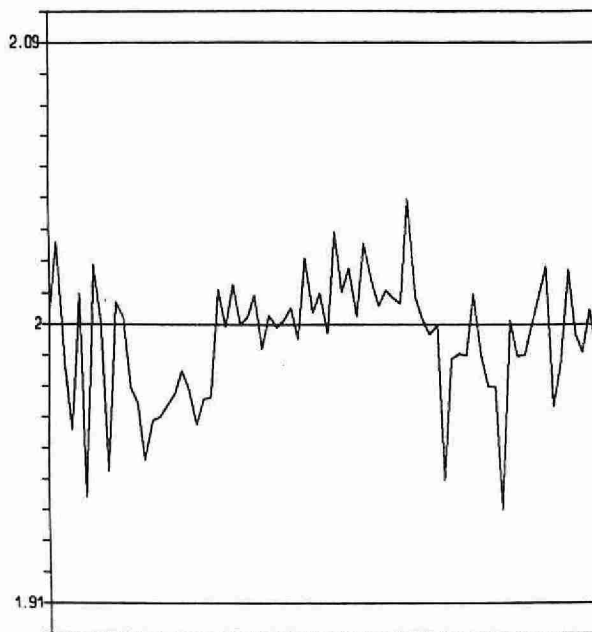
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
99	0.00 - 0.50	0.0098	8.2
60	0.50 - 1.00	0.0139	7.1
22	1.00 - 2.00	0.0215	2.3
181	Overall	0.0123	

OTHER CHECKS:

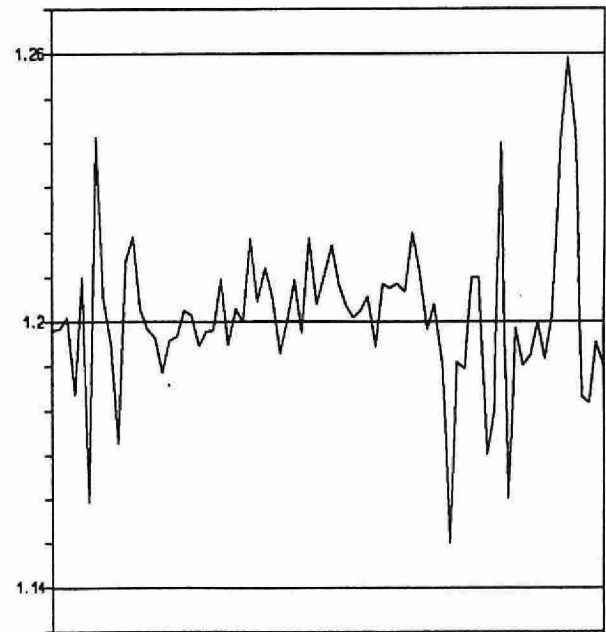
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	76	0.018	0.115

CHLORIDE (mg/L as Cl)

QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: ug/Filter as Cl
Work Station Code	: PRLOV	Unit Code	: 361960
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as Cl.

Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

CHLORIDE

QUALITY CONTROL DATA FROM 21/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 100 µg/filter as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	35	80.0	80.07	0.07	0.971
B :	35	20.0	20.50	0.50	0.606
A+B :	35	100.0	100.57	0.57	1.079
A-B :	35	60.0	59.57	-0.43	1.207

s.d.(AB) S(between runs): 0.81 Sw(within run): 0.85 S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.3 - 103.7 for A+B
57.5 - 62.5 for A-B

DUPLICATES:

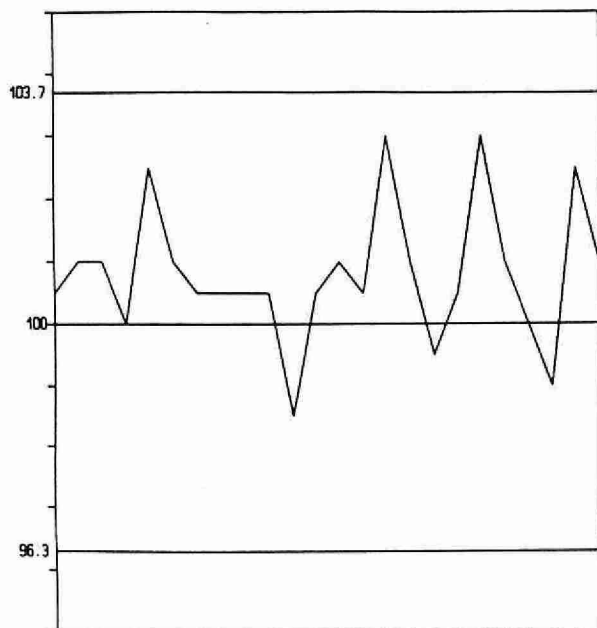
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
14	0.0	- 10.0	0.329	4.1
25	10.0	- 20.0	0.425	3.6
23	20.0	- 50.0	0.804	3.1
0	50.0	- 100.0	N.A.	N.A.
62	Overall		0.530	

OTHER CHECKS:

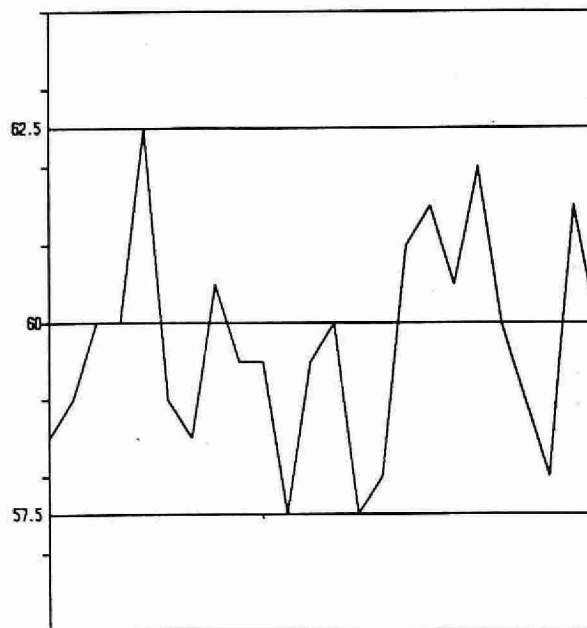
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	35	0.000	0.000

CHLORIDE (ug/filter as Cl)

QUALITY CONTROL DATA FROM 21/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** CLAY ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CLAY	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Method Reference No.	: E3037A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation, a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 μ m) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. Measurement of the percent silt and clay in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

- Sartorius 4 place digital balance (Handy)
- Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus round robin ECSS samples (run occasionally)

CLAY

QUALITY CONTROL DATA FROM 31/01/91 TO 25/03/91

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	0.4	0.548
R2 :	5	53.6	9.839

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.0 - 20.0	0	0
0	20.0 - 50.0	N.A.	N.A.
0	50.0 - 100.0	N.A.	N.A.
0	Overall	N.A.	

***** COLOUR, TRUE *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 15/10/80
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: DOCOL	Unit Code	: 340000
Method Code	: 1102KP	Supervisor	: A. Neary
Method Reference No.	: E3025A		
Sample Type/Matrix	: Streams, Lakes		

SAMPLING:

Quantity Required : 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured on a settled sample colourimetrically in a system calibrated with acidified chloroplatinate standards. Colour is measured using a 400-450 nm broadband blue filter. Turbidity effects are partially suppressed by using a broadband red filter. True colour is calculated from the two absorbance measurements using an empirically derived equation.
Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

Two colourimeters, one with broadband blue filter (400-450 nm) and the other with broadband red filter (660-740 nm). Colourimetric measurement is through a 4.0 cm. light path.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5

CALIBRATION:

Blank Only

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA, QCB

NOTES:

Slope factor is changed whenever light source in a colourimeter or cell is replaced. This is accomplished by analyzing 7 standards.

Work station was formerly DOCC and changed in January 1991 to DOCOL.

COLOUR, TRUE

QUALITY CONTROL DATA FROM 04/01/91 TO 18/12/91

Lab: Dorset

Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	48	75.0	74.79	-0.21	0.649
B :	48	25.0	24.74	-0.26	0.581
A+B :	48	100.0	99.53	-0.47	0.923
A-B :	48	50.0	50.05	0.05	0.817
C :	48	25.0	24.74	-0.26	0.581
D :	48	5.0	5.04	0.04	0.363
C+D :	48	30.0	29.78	-0.22	0.772
C-D :	48	20.0	19.70	-0.30	0.586

s.d.(AB) S(between runs): 0.62 Sw(within run): 0.58 S/Sw: 1.07

s.d.(CD) S(between runs): 0.48 Sw(within run): 0.41 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.70	-	103.30	for	A+B
47.50	-	52.50	for	A-B
27.70	-	32.30	for	C+D
18.20	-	21.80	for	C-D

DUPLICATES:

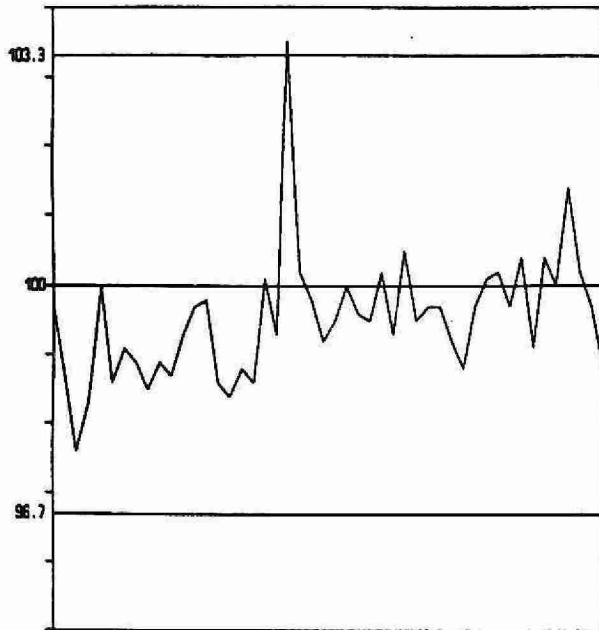
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
67	0.0	- 20.0	0.286	5.39
45	20.0	- 50.0	0.331	11.02
33	50.0	- 100.0	0.734	5.36
145	Overall		0.378	

OTHER CHECKS:

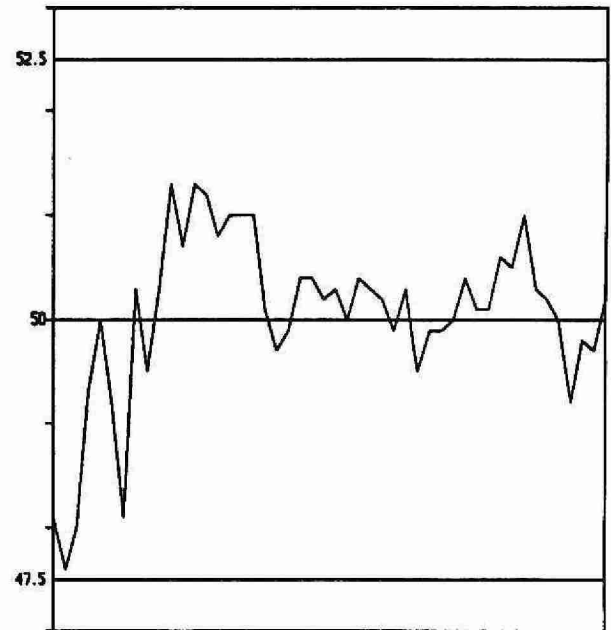
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	48	0.11875	0.2944

COLOUR, TRUE (TCU)

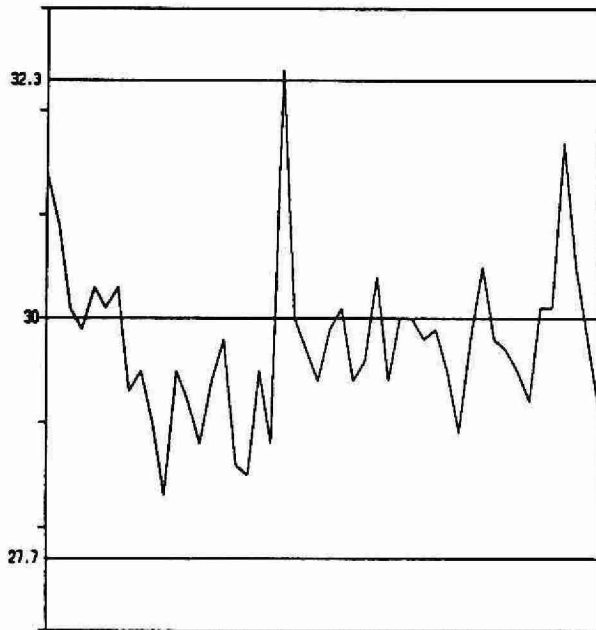
QUALITY CONTROL DATA FROM 04/01/91 TO 18/12/91



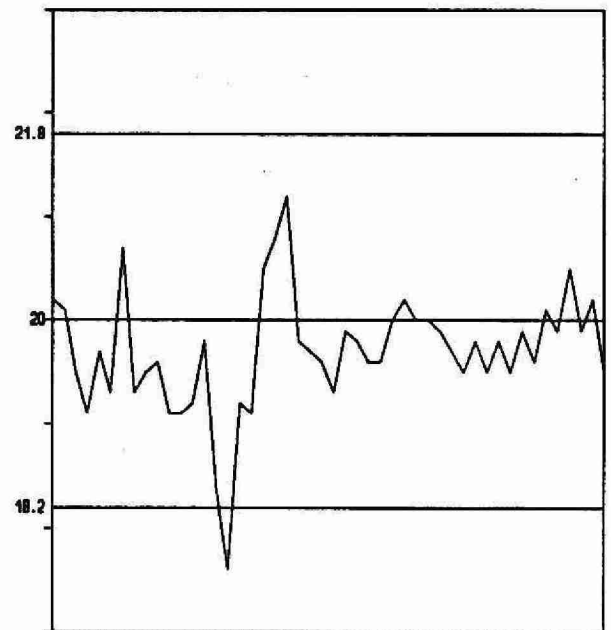
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** COLOUR, TRUE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 13/03/84
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: WCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: M. Rawlings
Method Reference No.	: E3219A		
Sample Type/Matrix	: Domestic Waters, Effluents, Surface Waters, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured colourimetrically on the supernatant of a settled sample in a system calibrated with acidified chloroplatinate standards. The sample stream is measured using a broadband blue filter. Residual turbidity effects are suppressed by using a broadband red filter and increased path length in the reference stream.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system. Colour measurement is through a 3.0 cm. light path using a broadband filter (400-450 nm). Turbidity measurement is through a 5.0 cm. light path using a different broadband filter (660-740 nm). Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.5

T value: 2.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

COLOUR, TRUE

QUALITY CONTROL DATA FROM 03/01/91 TO 21/12/91

Lab: Colourimetry

Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	64	70.0	69.81	-0.11	0.585
B :	64	25.0	25.16	0.16	0.553
A+B :	64	95.0	94.97	-0.03	0.925
A-B :	64	45.0	44.64	-0.36	0.665
C :	64	25.0	25.16	0.16	0.553
D :	64	7.5	7.43	-0.07	0.247
C+D :	64	32.5	32.59	0.09	0.690
C-D :	64	17.5	17.74	0.24	0.508

s.d.(AB) S(between runs): 0.60 Sw(within run): 0.47 S/Sw: 1.21

s.d.(CD) S(between runs): 0.43 Sw(within run): 0.36 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

91.60	-	98.40	for	A+B
42.75	-	47.25	for	A-B
29.60	-	35.40	for	C+D
15.55	-	19.45	for	C-D

DUPLICATES:

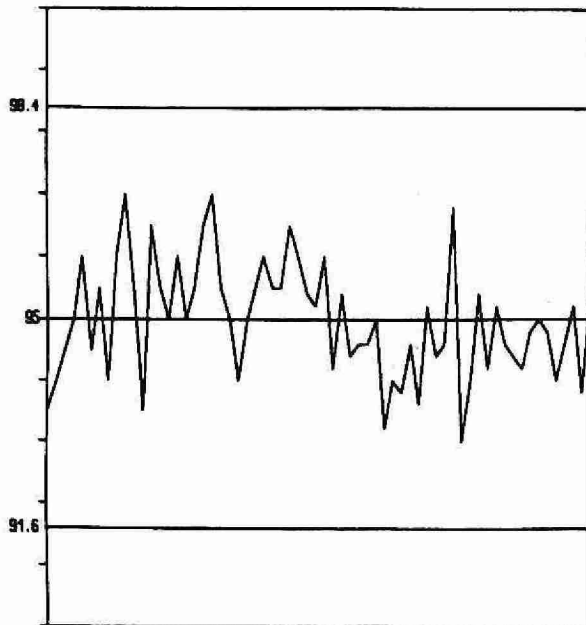
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
109	0.00	-	5.00	0.289	15.65
64	5.00	-	25.00	0.471	5.15
10	25.00	-	100.00	0.865	2.15
183	Overall			0.354	

OTHER CHECKS:

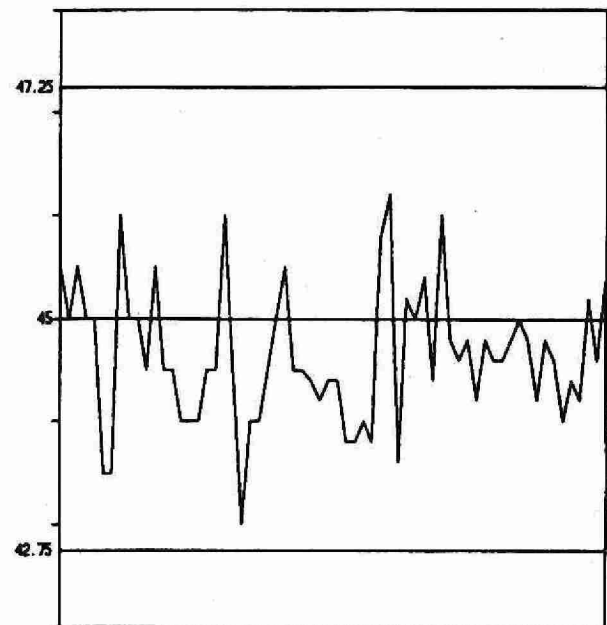
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	64	0.234	0.339

COLOUR, TRUE (TCU)

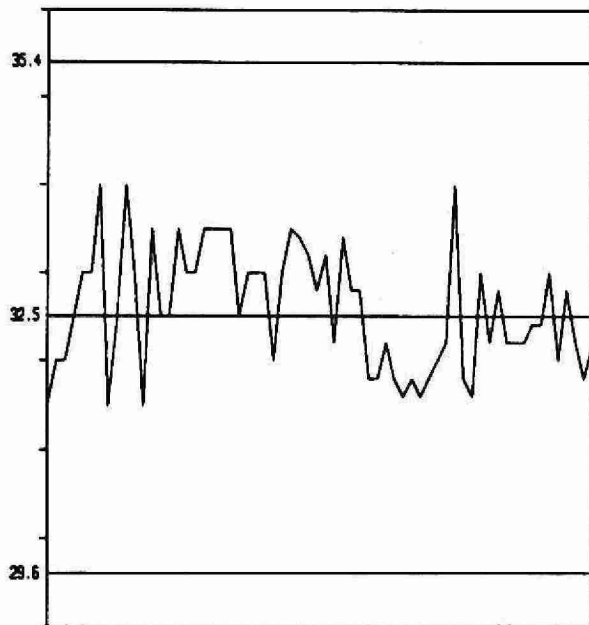
QUALITY CONTROL DATA FROM 03/01/91 TO 21/12/91



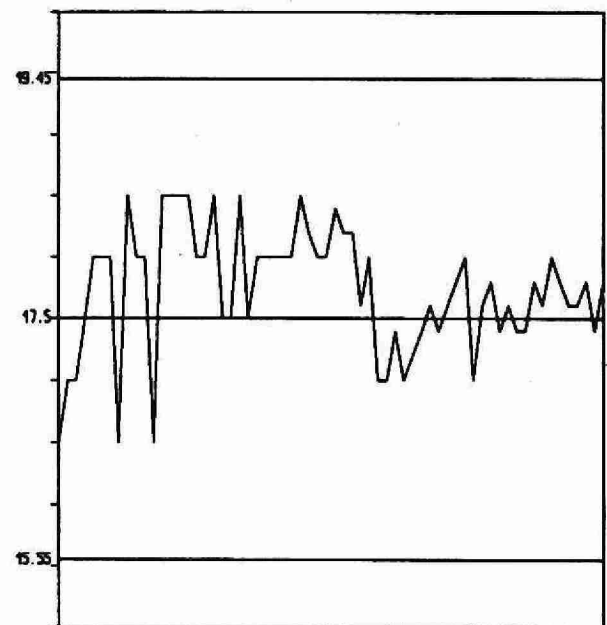
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: DOCOND	Unit Code	: 350351
Method Code	: 0903CM	Supervisor	: A. Neary
Method Reference No.	: E3024A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Soil Leachates		

SAMPLING:

Quantity Required	: 75 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell and equilibrated to 25°C. The conductivity is read directly from a digital display.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

None

CONTROLS:

Calibration	: LTB plus 4 standards, e.g. QCA, QCB, 147 uS/cm plus 717.7 uS/cm stds.
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NOTES:

T value is based on duplicate analyses at concentrations above the lowest range.
Work station was formerly DOCC and changed in January 1991 to DOCOND.

Control limits that were exceeded were due to contamination of the LTB and consequently data was accepted.

CONDUCTIVITY

QUALITY CONTROL DATA FROM 04/01/91 TO 27/12/91

Lab: Dorset

Analytical Range: - to 300 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	82	146.7	146.77	0.07	0.899
B :	82	51.8	52.35	0.55	0.681
A+B :	82	198.5	199.12	0.62	1.314
A-B :	82	94.9	94.43	-0.47	0.906
C :	82	51.8	52.44	0.64	0.654
D :	82	14.9	15.03	0.13	0.570
C+D :	82	66.7	67.47	0.77	1.145
C-D :	82	36.9	37.40	0.50	0.439

s.d.(AB) S(between runs): 0.80 Sw(within run): 0.64 S/Sw: 1.2

s.d.(CD) S(between runs): 0.61 Sw(within run): 0.31 S/Sw: 2.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

195	-	202	for	A+B
92.2	-	97.6	for	A-B
64.9	-	68.5	for	C+D
35.6	-	38.2	for	C-D

DUPLICATES:

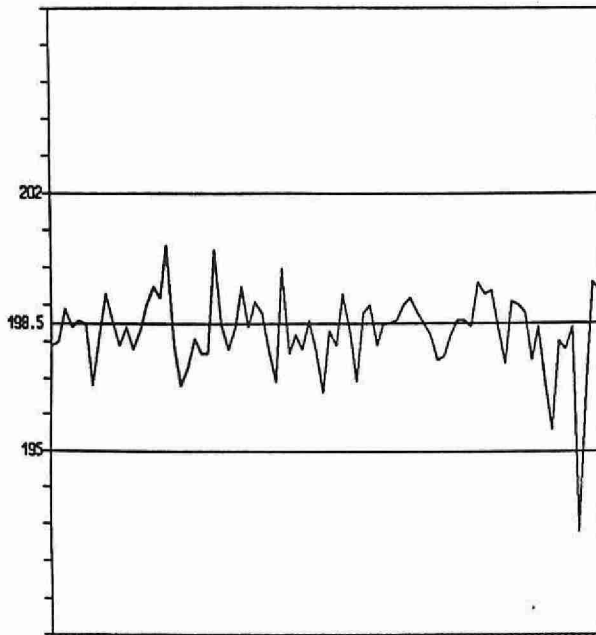
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
22	0.0	-	20.0	0.218	2.5
210	20.0	-	100.0	0.270	0.8
13	100.0	-	300.0	0.850	23.5
245	Overall			0.279	

OTHER CHECKS:

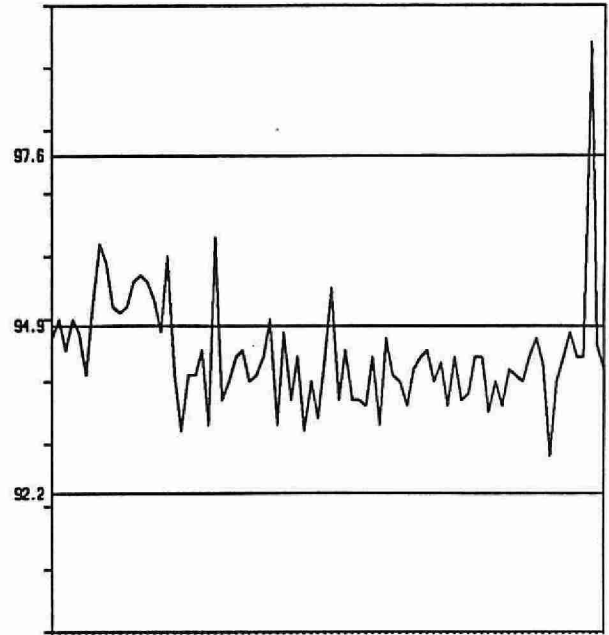
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	82	0.79	0.425

CONDUCTIVITY (uS/cm)

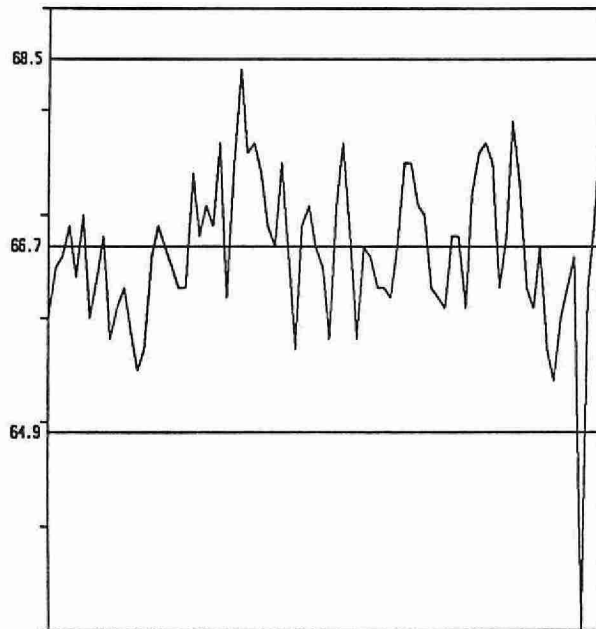
QUALITY CONTROL DATA FROM 04/01/91 TO 27/12/91



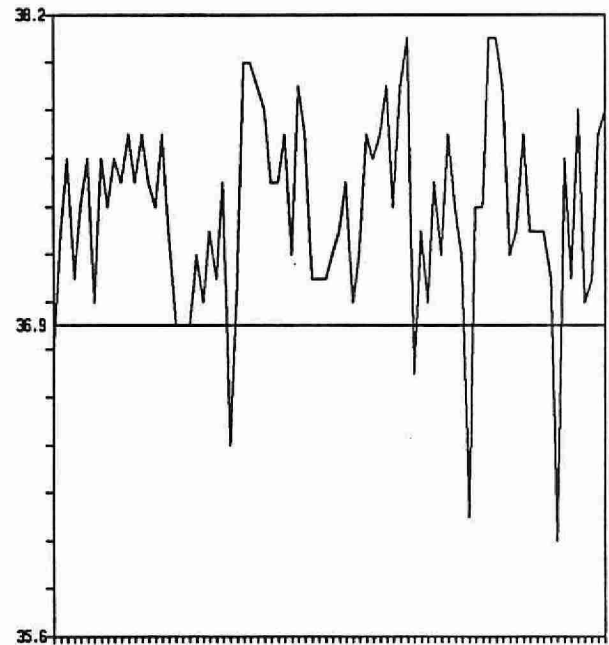
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: PRCON	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Method Reference No.	: E3177A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, The conductivity of the sample is measured.

INSTRUMENTATION:

Automated modular continuous flow conductivity system comprised of sampler, water bath, conductivity meter with cell, chart recorder.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

Compatibility between conductivity meter and chart recorder is confirmed by checking 3 standard resistances.

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 solution every 10 samples

NOTES:

A calibration standard for the ion chromatographic system is used to monitor the drift for the conductivity system, but its theoretical conductivity is unknown.

CONDUCTIVITY

QUALITY CONTROL DATA FROM 28/01/91 TO 18/12/91

Lab: Ion Chromatography

Analytical Range: - to 100.0 $\mu\text{S/cm}$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	44.5	44.3	-0.2	0.726
B :	36	7.5	7.7	0.2	0.364
A+B :	36	52.0	52.1	0.1	0.949
A-B :	36	37.0	36.7	-0.3	0.647

s.d.(AB) S(between runs): 0.57 Sw(within run): 0.46 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

43.0	-	61.0	for	A+B
31.0	-	43.0	for	A-B

DUPLICATES:

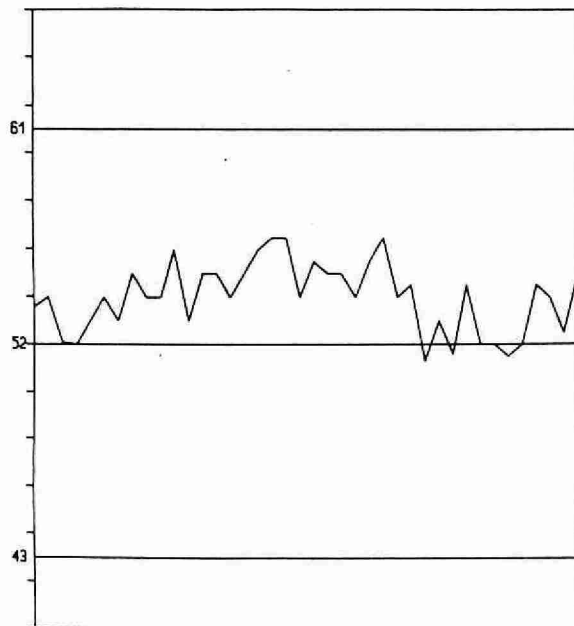
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
28	0.0	-	10.0	0.2768	4.1
41	10.0	-	25.0	0.5522	3.7
34	25.0	-	75.0	0.8132	3.5
0	75.0	-	100.0	N.A.	N.A.
103	Overall			0.5305	

OTHER CHECKS:

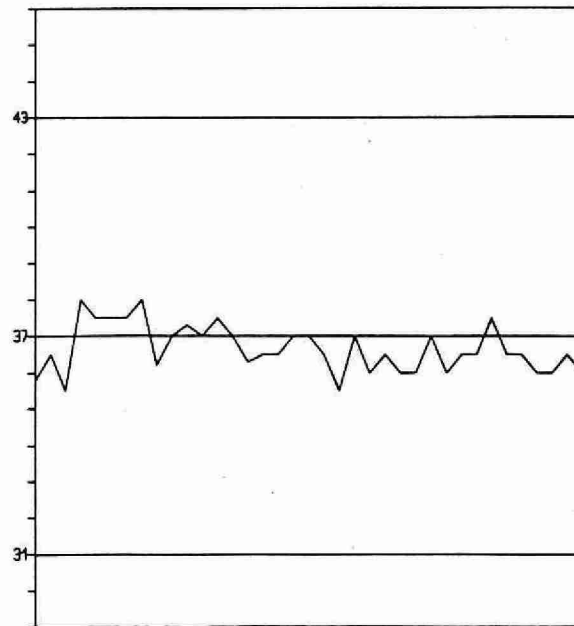
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.2806	0.1261

CONDUCTIVITY (uS/cm)

QUALITY CONTROL DATA FROM 28/01/91 TO 18/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: RATS	Unit Code	: 350351
Method Code	: 002B12	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured.
pH, Gran alkalinity and total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: BL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

CONDUCTIVITY

QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91

Lab: Titration

Analytical Range: - to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	93	717.8	717.0	-0.8	1.588
B :	93	147.0	147.5	0.5	0.618
A+B :	93	864.8	864.5	-0.3	1.827
A-B :	93	570.8	569.5	-1.3	1.572
C :	93	147.0	147.5	0.5	0.618
D :	93	37.1	38.2	1.1	0.317
C+D :	93	184.1	185.7	1.6	0.783
C-D :	93	109.9	109.3	0.6	0.594

s.d.(AB) S(between runs): 1.20 Sw(within run): 1.11 S/Sw: 1.08

s.d.(CD) S(between runs): 0.49 Sw(within run): 0.42 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

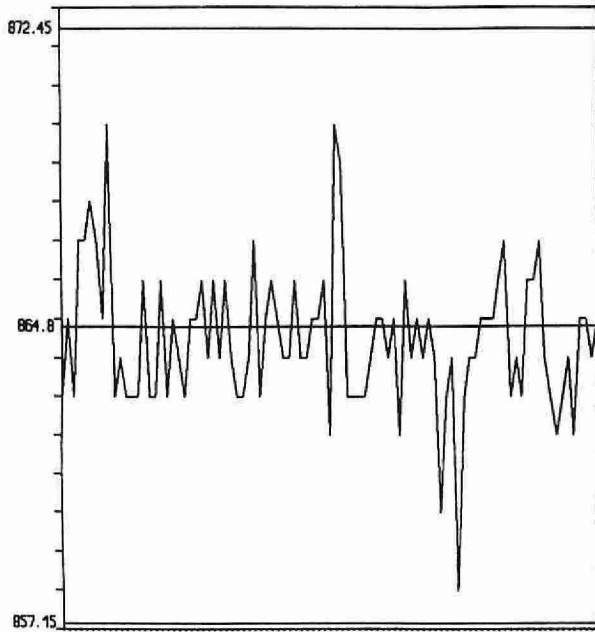
857.15	-	872.45	for	A+B
565.7	-	575.9	for	A-B
180.1	-	188.11	for	C+D
107.23	-	112.57	for	C-D

DUPLICATES:

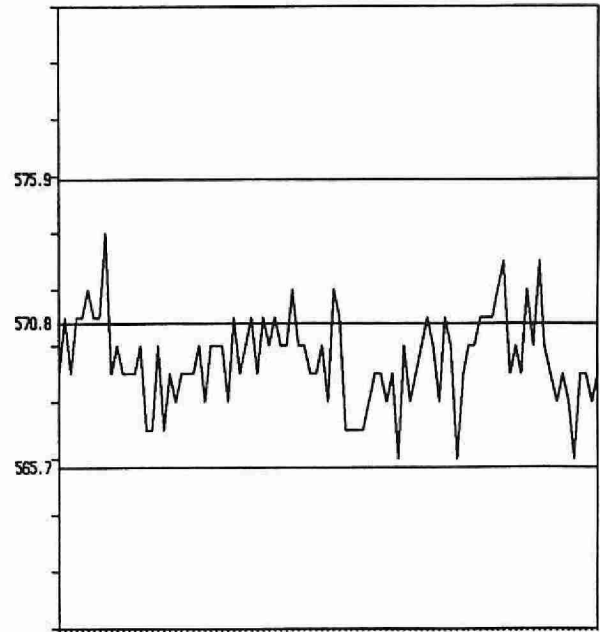
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
56	0	-	200	1.293	1.9
96	200	-	500	1.380	0.4
80	500	-	1000	2.341	0.5
16	1000	-	2000	5.494	0.5
248	Overall			1.703	

CONDUCTIVITY (uS/cm)

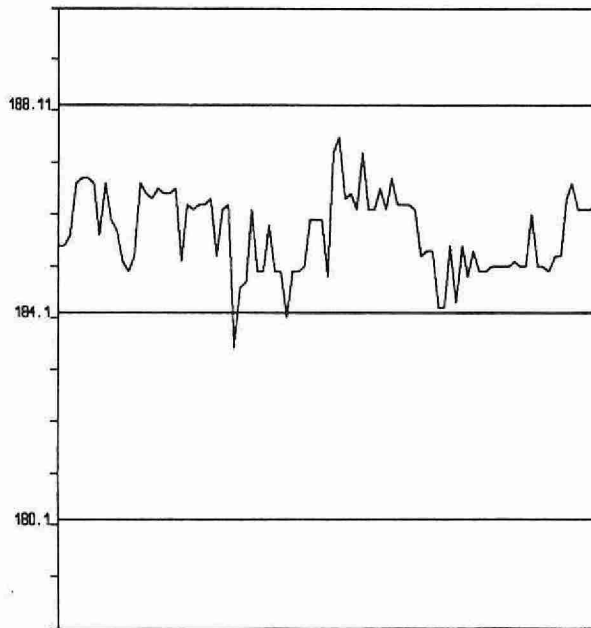
QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91



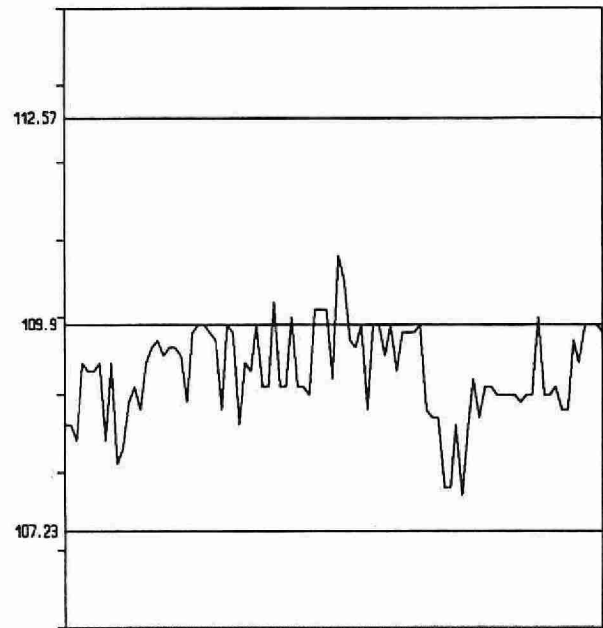
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Industrial effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured.
pH and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

CONDUCTIVITY

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Titration

Analytical Range: - to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	135	1413.0	1411.8	-1.2	8.028
B :	135	717.8	717.5	0.3	3.266
A+B :	135	2130.8	2129.3	-1.5	10.110
A-B :	135	695.2	694.3	-0.9	6.932
C :	135	717.8	717.5	-0.3	3.266
D :	135	147.0	148.3	1.3	1.125
C+D :	135	864.8	865.8	1.0	3.934
C-D :	135	570.8	569.2	-1.6	2.897

s.d.(AB) S(between runs): 6.1 Sw(within run): 4.9 S/Sw: 1.3

s.d.(CD) S(between runs): 2.4 Sw(within run): 2.0 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

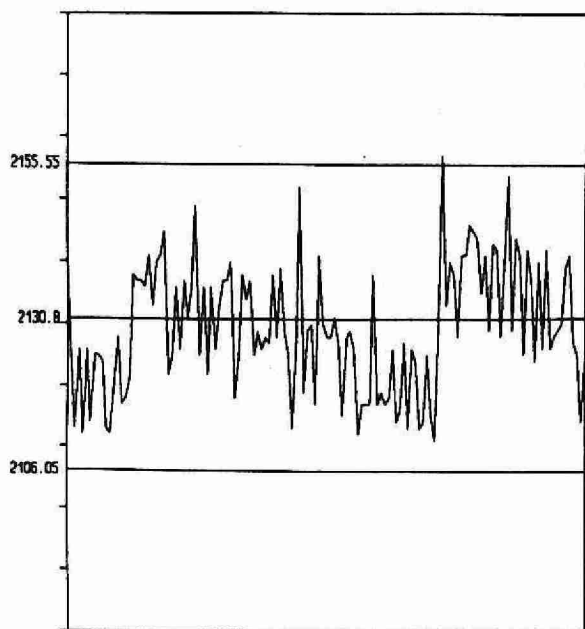
2106.05	-	2155.55	for	A+B
678.70	-	711.70	for	A-B
851.48	-	878.12	for	C+D
561.92	-	579.68	for	C-D

DUPLICATES:

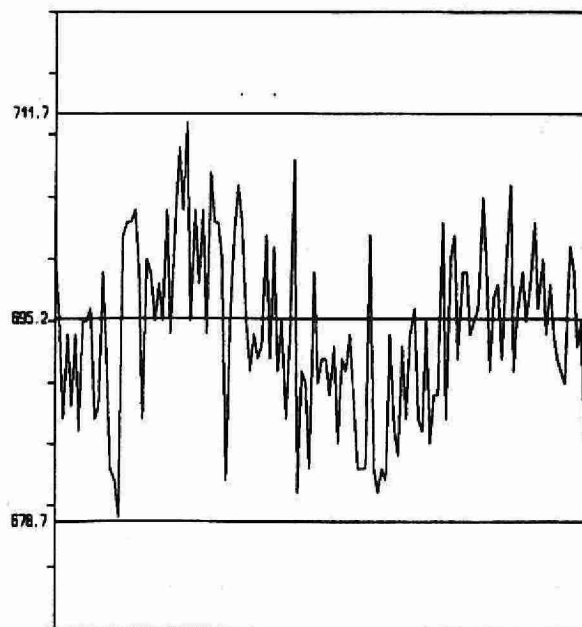
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
31	0	- 100	0.619	1.1
182	100	- 500	1.671	0.6
111	500	- 1000	2.893	0.4
28	1000	- 2000	7.328	1.2
23	2000	- 15000	33.526	0.7
375	Overall		2.500	

CONDUCTIVITY (uS/cm)

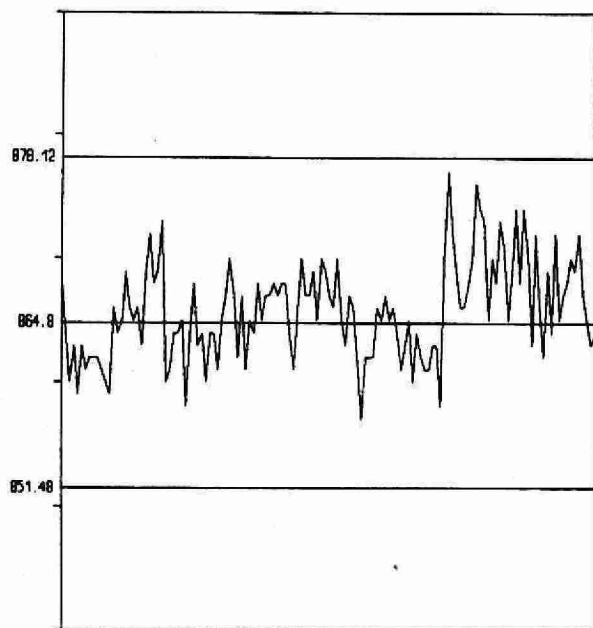
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



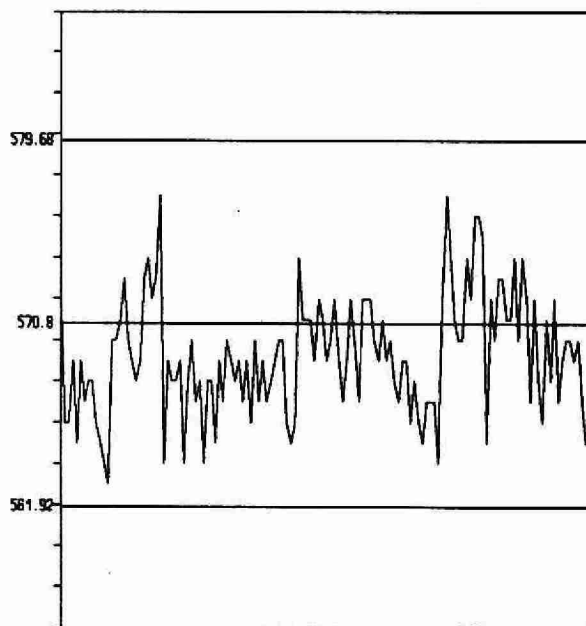
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 20/05/87
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WQSDIRT	Unit Code	: 350351
Method Code	: 004AB4	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 75 mL
Container	: Plastic or glass

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured; samples are filtered first if necessary. Analysis is performed on supernatant or filtrate.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 5	T value: 25
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CONTROLS:

Calibration	: BL plus 4 standards, e.g. QCA
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CONDUCTIVITY

QUALITY CONTROL DATA FROM 07/12/91 TO 11/12/91

Lab: Titration

Analytical Range: - to 10000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	30	6668	6656	-12.0	31.126
B :	30	2767	2779	12.0	18.537
A+B :	30	9435	9435.97	0.97	45.403
A-B :	30	3901	3878	-23.0	23.739
C :	30	1413	1411	2.0	9.071
D :	30	717	717.3	0.3	2.708
C+D :	30	2130	2128	-2.0	10.147
C-D :	30	696	693	-3.0	8.735

s.d.(AB) S(between runs): 25.6 Sw(within run): 16.8 S/Sw: 1.5

s.d.(CD) S(between runs): 6.70 Sw(within run): 6.20 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

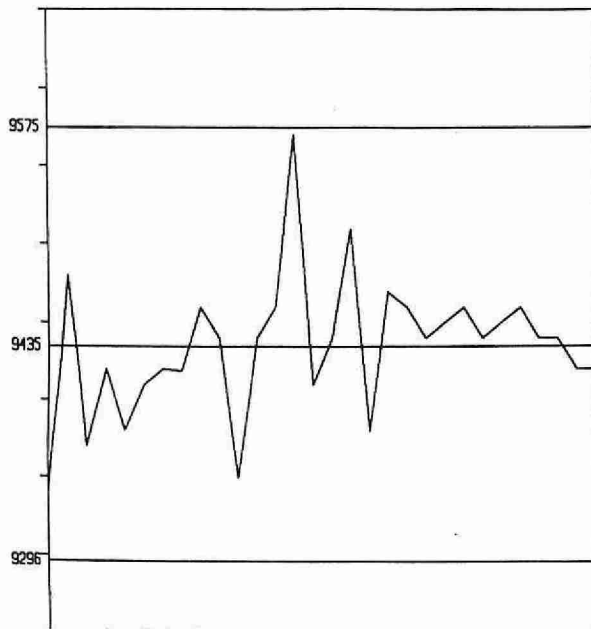
9295	-	9575	for A+B
3808	-	3994	for A-B
2090	-	2172	for C+D
668	-	723	for C-D

DUPLICATES:

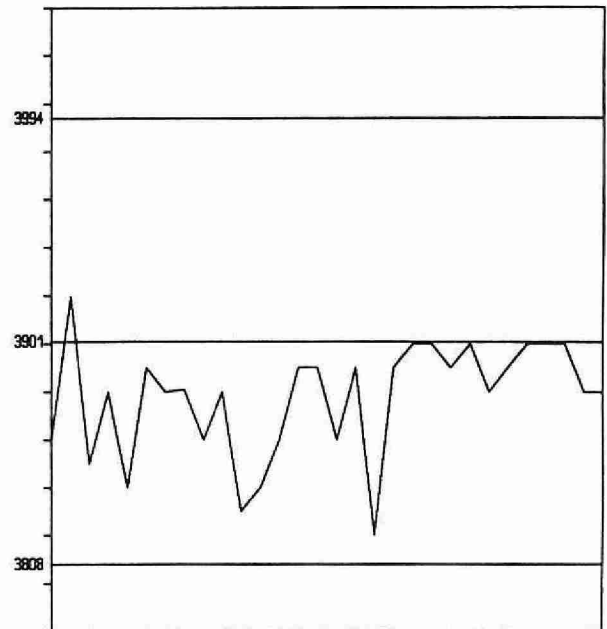
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
36	0 - 500	0.968	0.4
35	500 - 1000	2.699	0.4
15	1000 - 10000	8.244	0.7
86	Overall	2.120	

CONDUCTIVITY (uS/cm)

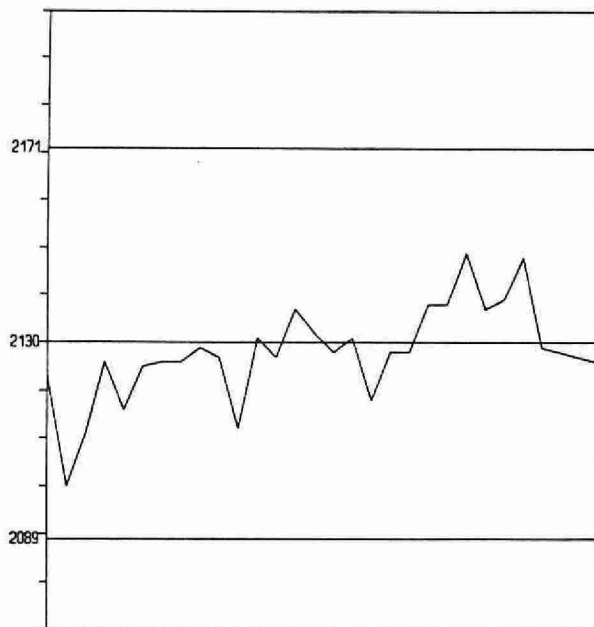
QUALITY CONTROL DATA FROM 07/01/91 TO 11/12/91



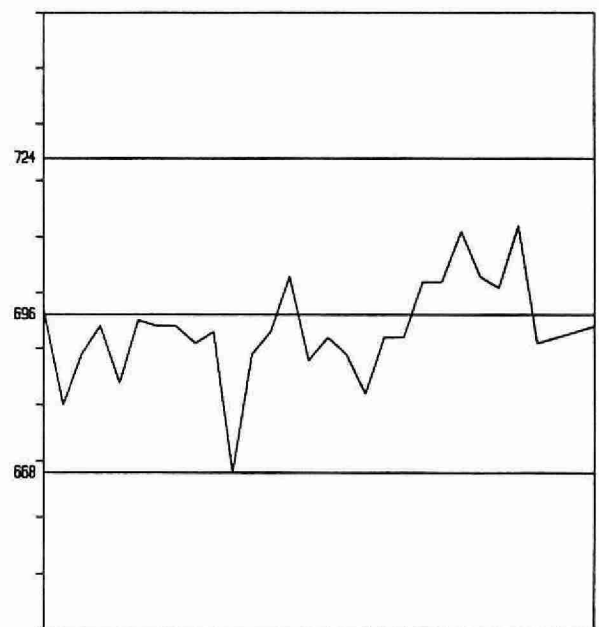
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** COPPER, ACID EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CUUT	Units	: ug/g as Cu
Work Station Code	: DOHMTE	Unit Code	: 073829
Method Code	: 551AA1	Supervisor	: A. Neary
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm. A subsample is ground to less than 500 um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Cu by AAS at 324.8 nm using an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale value.

Lead, nickel and zinc are also determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types, 2 method blanks and one judiciously blended sample extract run with each run.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

COPPER, ACID-EXTRACTABLE

QUALITY CONTROL DATA FROM 21/02/91 TO 23/02/91

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	37.0	37.77	0.77	0.351
B :	3	13.0	10.13	-2.87	0.737
A+B :	3	50.0	47.90	-2.10	0.436
A-B :	3	24.0	27.63	3.63	1.069

s.d.(AB) S(between runs): 0.58 Sw(within run): 0.76 S/Sw: 0.76

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.5 - 57.5 for A+B
19.0 - 29.0 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	9.833	0.379
R2 :	3	9.767	0.321
R3 :	3	9.833	0.379

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.0 - 10.0	0.4019	4.3
0	10.0 - 20.0	N.A.	N.A.
0	20.0 - 50.0	N.A.	N.A.
9	Overall	0.4019	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	3	0.000	0.000

*** COPPER, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: CUUT	Units	: ug/L
Work Station Code	: DOTRACE	Unit Code	: 063829
Method Code	: 005AF2	Supervisor	: A. Neary
Method Reference No.	: E3306A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required	: 5mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO ₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 324.8nm.
Absorbance : 0.8 at full scale

INSTRUMENTATION:

A graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.003	T value: 0.015
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CALIBRATION:

Blank plus 4 standards.

CONTROLS:

Calibration	: Long Term Blank, 1 NRC solution, 3 duplicates
Drift	: 1 blank plus 1 standard

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

COPPER, TOTAL

QUALITY CONTROL DATA FROM 03/01/91 TO 17/08/91

Lab: Dorset Soils

Analytical Range: - to 10.00 ug/L as Cu

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	40	3.60	3.84	0.24	0.522
B :	40	0.90	0.99	0.09	0.219
A+B :	40	4.50	4.81	0.31	0.530
A-B :	40	2.70	2.84	0.14	0.579

s.d.(AB) S(between runs): 0.40 Sw(within run): 0.41 S/Sw: 0.98

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.78 - 7.22 for A+B
0.66 - 4.74 for A-B

DUPLICATES:

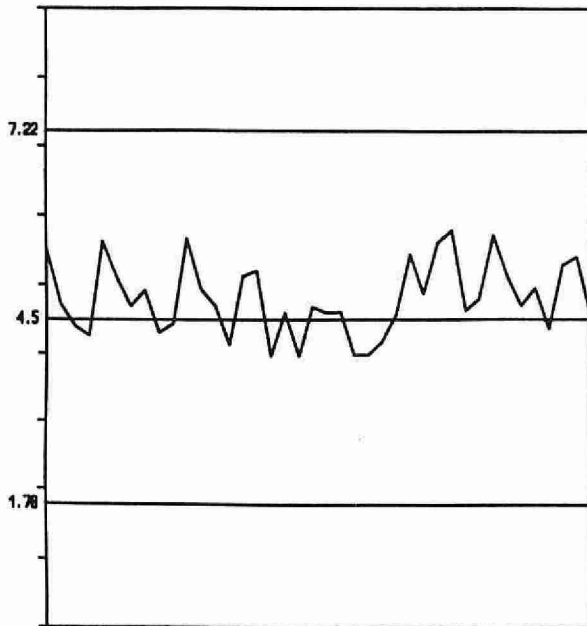
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
10	0.00 - 0.50	0.210	38.4
4	0.50 - 1.00	0.368	44.8
7	1.00 - 10.00	0.367	23.3
21	Overall	0.298	

OTHER CHECKS:

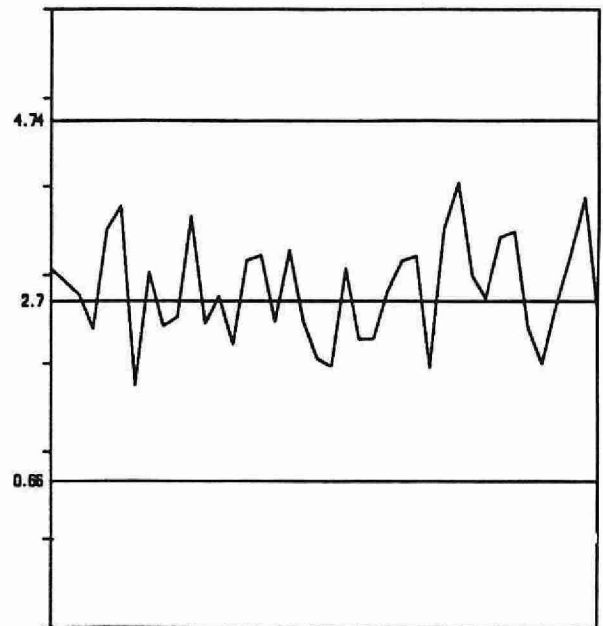
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	33	0.273	0.777

COPPER, TOTAL (ug/L as Cu)

QUALITY CONTROL DATA FROM 03/01/91 TO 17/08/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** FLUORIDE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/80
LIS Test Name Code	: FFIDUR	Units	: ug/L as F
Work Station Code	: DOSPF	Unit Code	: 063809
Method Code	: 001AIE	Supervisor	: A. Neary
Method Reference No.	: E3041A		
Sample Type/Matrix	: Precipitation, Lakes, and Streams		

SAMPLING:

Quantity Required : 50 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Fluoride is determined by specific ion electrode using an automated flow system. Prior to measurement the sample is mixed with a high ionic strength buffer containing; sodium citrate, disodium ethylenediaminetetraacetate (EDTA), phosphoric acid, and sufficient sodium hydroxide to obtain pH 6.7.

INSTRUMENTATION:

Automated modular continuous flow ion specific electrode system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL plus 1 standard in duplicate
Interference : Combined fluoride and aluminum standard confirms that aluminum is not an interference.

NOTES:

Values for recoveries are based upon the average recovery value obtained.

FLUORIDE

QUALITY CONTROL DATA FROM 03/01/91 TO 23/12/91

Lab: Dorset

Analytical Range: - to 70.0 ug/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	71	48	47.97	-0.03	0.874
B :	71	24	23.91	-0.09	0.515
A+B :	71	72	71.88	-0.12	1.220
A-B :	71	24	24.06	-0.06	0.755

s.d.(AB) S(between runs): 0.72 Sw(within run): 0.53 S/Sw: 1.34

On any given day the calibration is accepted if the values obtained lie within the ranges:

67.5 - 76.5 for A+B
21.0 - 27.0 for A-B

DUPLICATES:

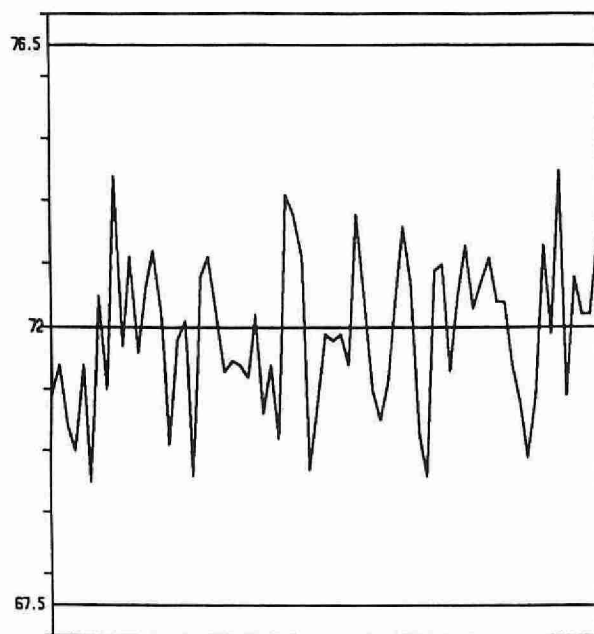
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
34	0.0	-	10.0	0.447	6.1
106	10.0	-	40.0	0.593	0.9
109	40.0	-	70.0	0.986	0.3
249	Overall			0.760	

OTHER CHECKS:

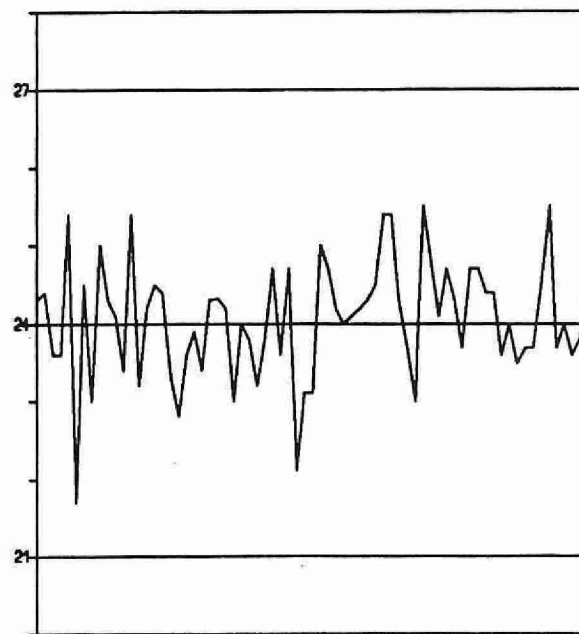
	Number of Data	Data Mean	Standard(1) Deviation
Al Interference	71	59.64	0.972

FLUORIDE (ug/L as F)

QUALITY CONTROL DATA FROM 03/01/91 TO 23/12/91



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
LIS Test Name Code	: FFIDUR	Units	: mg/L as F
Work Station Code	: WFNO3	Unit Code	: 064809
Method Code	: 003AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3221A		
Sample Type/Matrix	: Domestic Waters, Surface Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Using an automated flow system the sample is distilled in the presence of sulphuric acid at 160°C; the distillate is then reacted (in an acetic acid-acetate buffer media) with Alizarin Fluorine Blue and lanthanum nitrate to form a ternary Alizarin Blue-lanthanide-fluoride complex.
Approximate absorbance: 0.8 at the full scale level.

INSTRUMENTATION:

Modular continuous flow colourimetric system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

FLUORIDE

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	121	1.6	1.604	0.004	0.0160
B :	121	0.8	0.801	0.001	0.0116
A+B :	121	2.4	2.405	0.005	0.0208
A-B :	121	0.8	0.802	0.002	0.0187
C :	121	0.8	0.801	0.001	0.0116
D :	121	0.16	0.160	0.000	0.0073
C+D :	121	0.96	0.962	0.002	0.0137
C-D :	121	0.64	0.641	0.001	0.0137

s.d.(AB) S(between runs): 0.014 Sw(within run): 0.013 S/Sw: 1.06

s.d.(CD) S(between runs): 0.010 Sw(within run): 0.010 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.28	-	2.52	for	A+B
0.72	-	0.88	for	A-B
0.91	-	1.01	for	C+D
0.59	-	0.69	for	C-D

DUPLICATES:

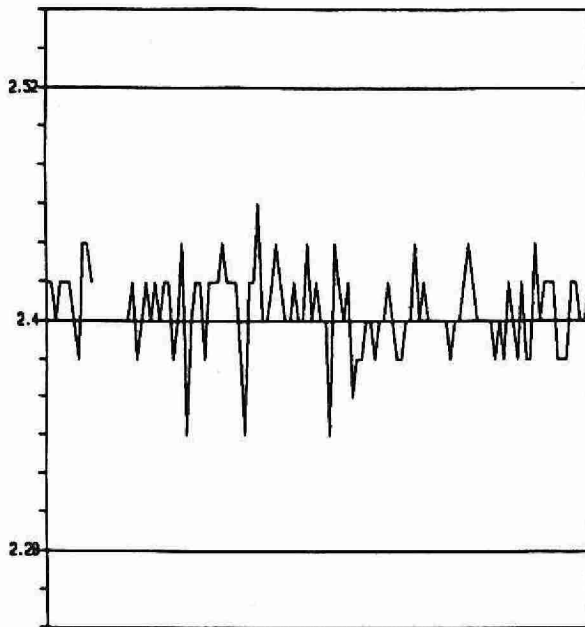
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
284	0.00	-	0.40	0.0098	10.1
37	0.40	-	1.00	0.0118	1.6
37	1.00	-	2.00	0.0205	1.6
358	Overall			0.0113	

OTHER CHECKS:

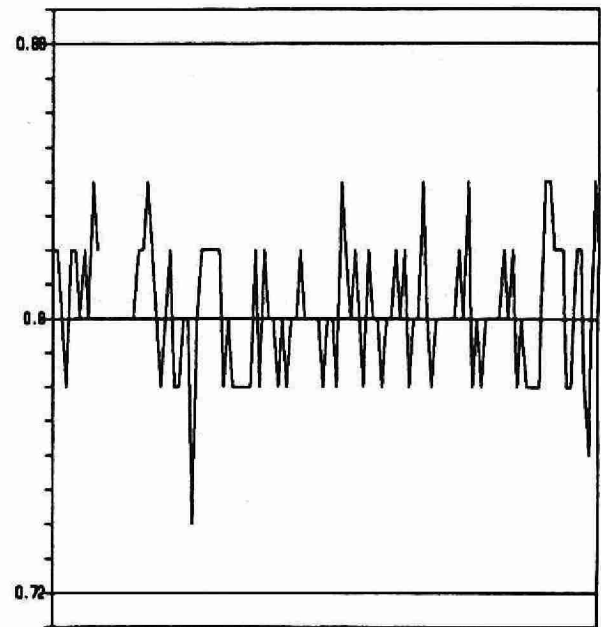
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	121	-0.00066	0.0096

FLUORIDE (mg/L as F)

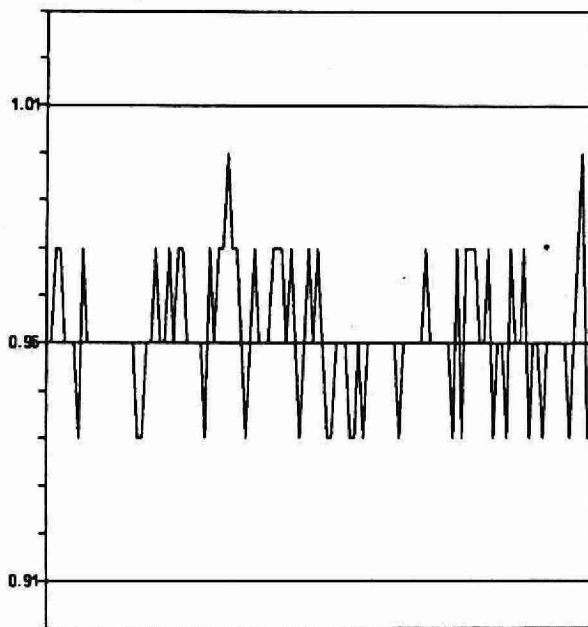
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



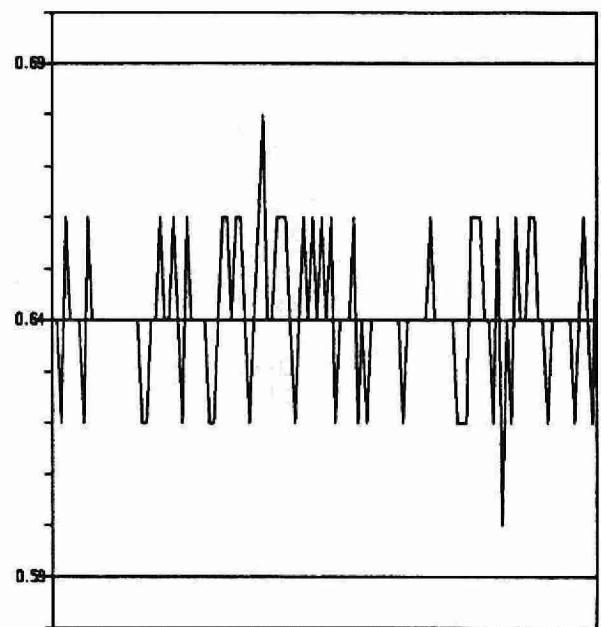
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: RMAAS	Unit Code	: 064915
Method Code	: CALC10	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation RMAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1.0

CALIBRATION:

Refer to Calcium and Magnesium tests at RMAAS

CONTROLS:

Refer to Calcium and Magnesium tests at RMAAS

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: WAAS	Unit Code	: 064915
Method Code	: CALC01	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation WAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

Refer to Calcium and Magnesium tests at WAAS

CONTROLS:

Refer to Calcium and Magnesium tests at WAAS

*** IRON, ACID AMMONIUM OXALATE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: FEEOX	Units	: % by wt as Fe
Work Station Code	: DOMETOX	Unit Code	: 070826
Method Code	: 302AA5	Supervisor	: A. Neary
Method Reference No.	: E3032A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 1 g
Container	: Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2mm. A subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant are added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275

REPORTING:

Maximum Significant Figures: 2	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: Three long term soil samples representing different soil types, 2 method blanks, 2 QC solutions at 25% and 75% of scale, round robin ECSS samples.
Drift	: BL plus 1 standard (100% F.S.) every 10 samples.

IRON, ACID AMMONIUM OXALATE EXTRACTABLE

QUALITY CONTROL DATA FROM 11/02/91 TO 13/02/91

Lab: Dorset Soils

Analytical Range: - to 2.00 % by wt. Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	1.50	1.493	-0.007	0.0115
B :	3	0.50	0.480	-0.020	0.0173
A+B :	3	2.00	1.973	-0.027	0.0058
A-B :	3	1.00	1.013	0.013	0.0289

s.d.(AB) S(between runs): 0.015 Sw(within run): 0.020 S/Sw: 0.72

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.70 - 2.30 for A+B
0.80 - 1.20 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.750	0.050
R2 :	3	0.440	0.020
R3 :	3	0.297	0.021

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.20	N.A.	N.A.
8	0.20 - 1.00	0.034	5.4
0	1.00 - 2.00	N.A.	N.A.
9	Overall	0.033	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	3	0.000	0.000

*** IRON, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEDI	Units	: % by wt.Fe
Work Station Code	: DOMETDI	Unit Code	: 070826
Method Code	: 301AA5	Supervisor	: A. Neary
Method Reference No.	: E3031A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500um (35 mesh)

ANALYTICAL PROCEDURE:

Iron is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Aluminum (and Manganese, when required) may be determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; two QC solutions at 25% and 75% of full scale, 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

IRON, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE

QUALITY CONTROL DATA FROM 21/01/91 TO 25/01/91

Lab: Dorset Soils

Analytical Range: - to 2.00 % by wt. Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	1.5	1.497	-0.003	0.012
B :	3	0.5	0.490	-0.010	0.010
A+B :	3	2.0	1.987	-0.013	0.021
A-B :	3	1.0	1.007	0.007	0.006

s.d.(AB) S(between runs): 0.011 Sw(within run): 0.004 S/Sw: 2.65

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.85 - 2.15 for A+B
0.90 - 1.10 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	1.157	0.021
R2 :	3	0.667	0.035
R3 :	3	0.403	0.012

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.40	N.A.	N.A.
0	0.40 - 1.00	N.A.	N.A.
8	1.00 - 2.00	0.032	2.4
9	Overall	0.031	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.000	0.000

*** IRON, SODIUM PYROPHOSPHATE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEPY	Units	: % by wt. Fe
Work Station Code	: DOMETALX	Unit Code	: 070826
Method Code	: 703AA5	Supervisor	: A. Neary
Method Reference No.	: E3030A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to < 2mm. A subsample is ground to <500um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 248.3 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

Aluminum and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of scale; 2 method blanks; round robin ECSS samples (run occasionally).

Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

IRON, SODIUM PYROPHOSPHATE EXTRACTABLE

QUALITY CONTROL DATA FROM 15/01/91 TO 17/01/91

Lab: Dorset Soils

Analytical Range: - to 1.00 % by wt. Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	0.75	0.753	0.003	0.006
B :	3	0.25	0.243	-0.007	0.015
A+B :	3	1.00	0.997	-0.003	0.012
A-B :	3	0.50	0.510	0.010	0.020

s.d.(AB) S(between runs): 0.012 Sw(within run): 0.014 S/Sw: 0.82

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.93 - 1.07 for A+B
0.45 - 0.55 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.62	0.026
R2 :	3	0.32	0.025
R3 :	3	0.16	0.020

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
3	0.00 - 0.20	0.010	6.4
5	0.20 - 0.50	0.009	4.6
1	0.50 - 1.00	N.A.	N.A.
9	Overall	0.009	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.000	0.000

*** IRON, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: FEUT	Units	: ug/L
Work Station Code	: DOFEMN	Unit Code	: 063826
Method Code	: 504BC2	Supervisor	: A. Neary
Method Reference No.	: E3303A		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required : 25mL
Container : glass or plastic, capped, acidified to 0.25% with HNO₃

ANALYTICAL PROCEDURE:

An undigested sample is introduced to an in-line UV digester. A reducing buffer is added to the sample and TPTZ is added to develop a blue colour, the intensity of which is proportional to the concentration of Fe in the sample. The colour is measured at 600nm.

INSTRUMENTATION:

- An AAII autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 2 T value: 10

CALIBRATION:

Blank plus 4 standards

CONTROLS:

Calibration : Long Term blank, 3 QC's, 4 duplicates
Drift : blank plus 1 standard every 10 samples.

IRON, TOTAL

QUALITY CONTROL DATA FROM 08/07/91 TO 19/12/91

Lab: Dorset

Analytical Range: - to 1000 ug/L as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	50	800.0	801.72	1.72	5.887
B :	50	200.0	200.12	0.12	4.520
A+B :	50	1000.0	1000.04	0.04	6.952
A-B :	50	600.0	601.60	1.60	5.330

s.d.(AB) S(between runs): 5.23 Sw(within run): 3.77 S/Sw: 1.39

On any given day the calibration is accepted if the values obtained lie within the ranges:

979 - 1021 for A+B
584 - 616 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	50	800.0	798.3	8.58
R2 :	50	200.0	199.82	5.07

DUPLICATES:

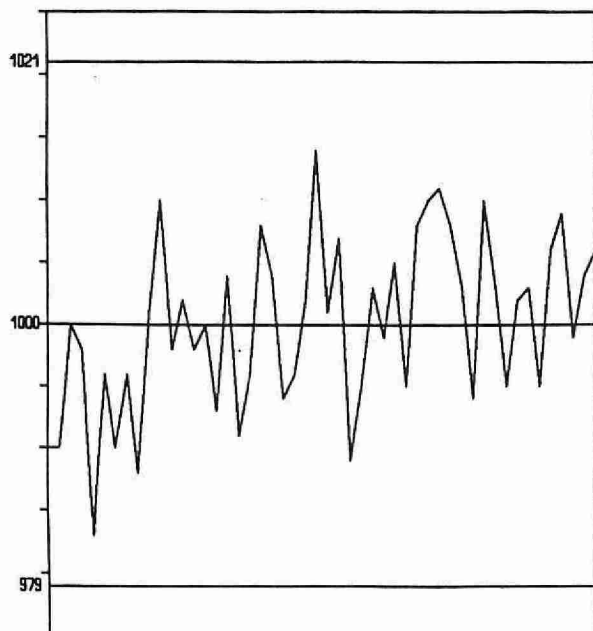
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
56	0.0 - 200.0	7.65	8.1
30	200.0 - 500.0	6.78	8.7
6	500.0 - 1000.0	6.85	0.9
92	Overall	7.50	

OTHER CHECKS:

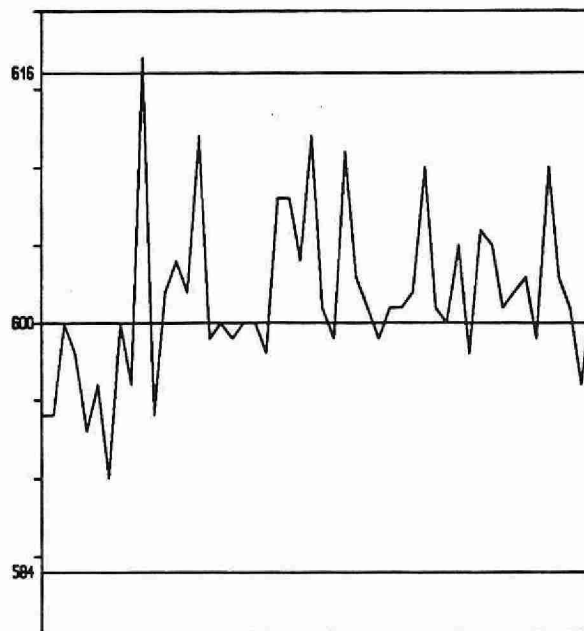
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	50	0.9	2.159
Digested Blank	50	0.58	2.627

IRON, TOTAL (ug/L as Fe)

QUALITY CONTROL DATA FROM 08/07/91 TO 19/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** LEAD, ACID EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PBUT	Units	: ug/g as Pb
Work Station Code	: DOHMTE	Unit Code	: 073882
Method Code	: 551AA1	Supervisor	: A. Neary
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm. A subsample is ground to <500um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Pb by AAS at 217.0 nm using an air-acetylene flame.

Approximate absorbance: 0.1 at the full scale value.

Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types; one judiciously blended sample digest run with each run; 2 method blanks.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

LEAD, ACID-EXTRACTABLE

QUALITY CONTROL DATA FROM 21/02/91 TO 23/02/91

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	39.00	30.77	-8.23	1.457
B :	3	16.50	11.65	-4.85	0.968
A+B :	3	55.50	42.41	-13.09	2.425
A-B :	3	22.50	19.12	-3.38	0.491

s.d.(AB) S(between runs): 1.24 Sw(within run): 0.35 S/Sw: 3.56

On any given day the calibration is accepted if the values obtained lie within the ranges:

40.5 - 70.5 for A+B
12.5 - 32.5 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	5.57	1.266
R2 :	3	12.37	2.023
R3 :	3	22.93	0.416

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.00 - 10.00	1.596	35.72
0	10.00 - 25.00	N.A.	N.A.
0	25.00 - 50.00	N.A.	N.A.
9	Overall	1.596	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	3	0.000	0.000

*** LEAD, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: PBUT	Units	: ug/L
Work Station Code	: DOTRACE	Unit Code	: 063882
Method Code	: 005AF2	Supervisor	: A. Neary
Method Reference No.	: E3307A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required : 5mL
Container : glass or plastic, capped, acidified to 0.25% with HNO₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 217nm.
Absorbance : 0.35 at full scale

INSTRUMENTATION:

A graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.003 T value: 0.015

CALIBRATION:

Blank plus 5 standards.

CONTROLS:

Calibration : Long Term Blank, 1 NRC solution, 3 duplicates
Drift : 1 blank plus 1 standard

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

LEAD, TOTAL

QUALITY CONTROL DATA FROM 09/10/91 TO 03/12/91

Lab: Dorset Soils

QUALITY CONTROL:

	Number of Data	Av. Conc Measured	Standard(1) Deviation
NRC :	15	0.3226	0.0052

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
30	0.00 - 0.20	0.009	22.5
7	0.20 - 5.00	0.057	13.2
0	5.00 - 10.00	N.A.	N.A.
37	Overall	0.0131	

NOTES:

A new series of low level calibration control standards from EPA ampoules is currently in place and the data are currently being collected. Thus, only data from NRC analysis are provided for this report.

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAA400	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J.McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

MAGNESIUM

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91

Lab: Atomic Absorption

Analytical Range: - to 0.500 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	51	0.30	0.3005	0.0005	0.0022
B :	51	0.05	0.0509	0.0009	0.0008
A+B :	51	0.35	0.3514	0.0014	0.0026
A-B :	51	0.25	0.2496	-0.0004	0.0021

s.d.(AB) S(between runs): 0.0017 Sw(within run): 0.0015 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.325 - 0.375 for A+B
0.235 - 0.265 for A-B

DUPLICATES:

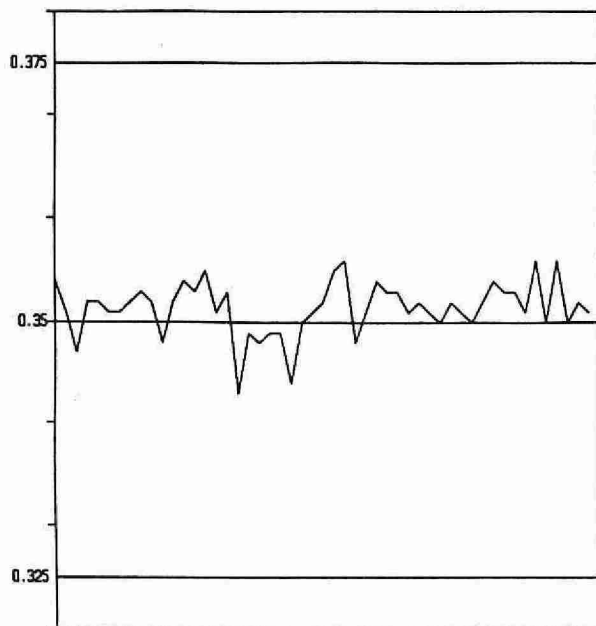
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
89	0.00 - 0.05	0.0006	3.2
33	0.05 - 0.10	0.0017	2.3
8	0.10 - 0.20	0.0032	1.9
13	0.20 - 0.50	0.0027	0.9
143	Overall	0.0010	

OTHER CHECKS:

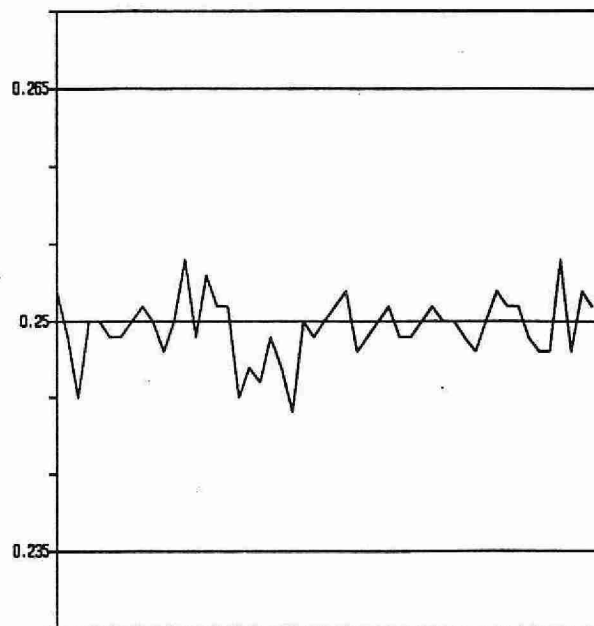
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	51	0.00002	0.0005

MAGNESIUM (mg/L as Mg)

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

MAGNESIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 31/12/91

Lab: Atomic Absorption

Analytical Range: - to 2.0 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	98	1.6	1.603	0.003	0.0078
B :	98	0.4	0.404	0.004	0.0029
A+B :	98	2.0	2.007	0.007	0.0087
A-B :	98	1.2	1.198	-0.002	0.0081
C :	98	0.4	0.404	0.004	0.0029
D :	98	0.1	0.105	0.005	0.0009
C+D :	98	0.5	0.509	0.009	0.0031
C-D :	98	0.3	0.299	-0.001	0.0030

s.d.(AB) S(between runs): 0.0059 Sw(within run): 0.0057 S/Sw: 1.0

s.d.(CD) S(between runs): 0.0022 Sw(within run): 0.0021 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91	-	2.09	for	A+B
1.14	-	1.26	for	A-B
0.41	-	0.59	for	C+D
0.24	-	0.36	for	C-D

DUPLICATES:

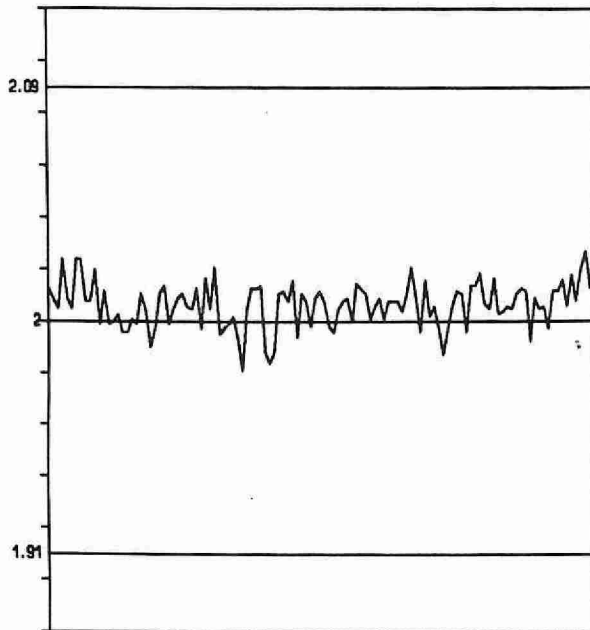
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
36	0.00 - 0.40	0.0031	1.3
175	0.40 - 1.00	0.0109	2.8
127	1.00 - 2.00	0.0173	2.2
338	Overall	0.0125	

OTHER CHECKS:

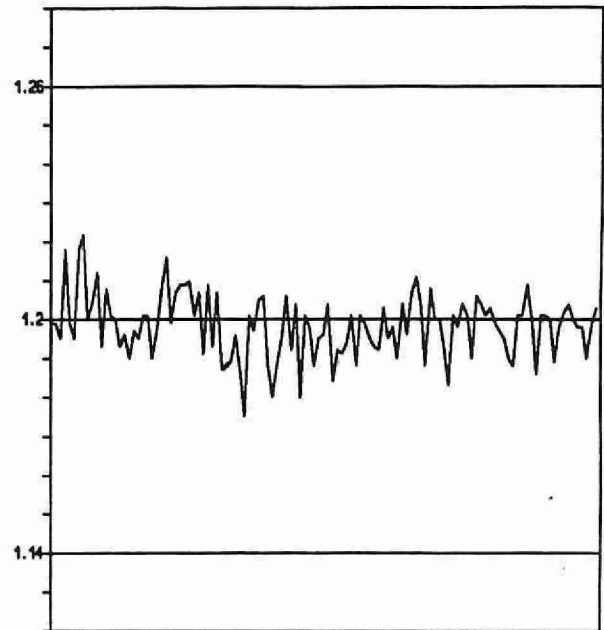
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	98	0.0001	0.0008

MAGNESIUM (mg/L as Mg)

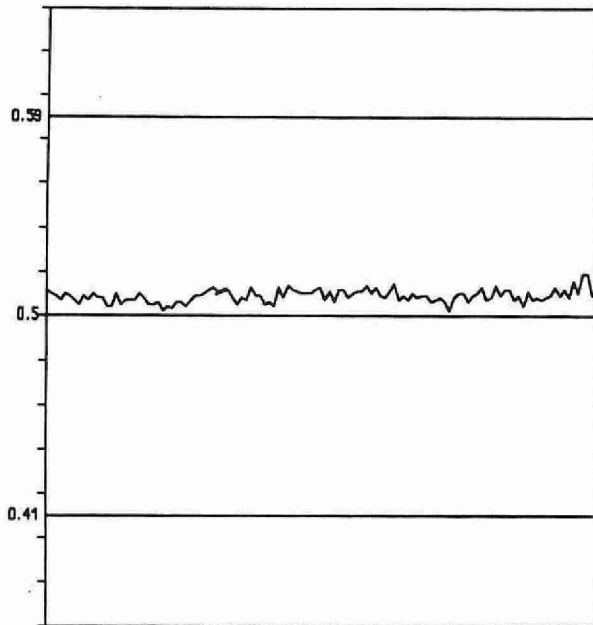
QUALITY CONTROL DATA FROM 02/01/91 TO 31/12/91



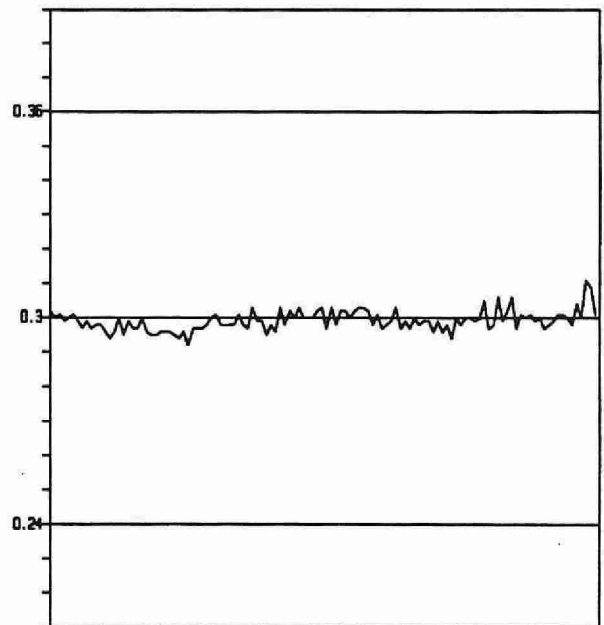
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: RMAAS	Unit Code	: 064812
Method Code	: 0901A1	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.19 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MAGNESIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91

Lab: Atomic Absorption

Analytical Range: - to 10.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	76	8.00	7.96	-0.04	0.0977
B :	76	2.00	1.99	-0.01	0.0361
A+B :	76	10.00	9.95	-0.05	0.1086
A-B :	76	6.00	5.98	-0.02	0.0995
C :	76	2.00	1.99	-0.01	0.0361
D :	76	0.50	0.501	0.001	0.0238
C+D :	76	2.50	2.49	-0.01	0.0501
C-D :	76	1.50	1.48	0.02	0.0350

s.d.(AB) S(between runs): 0.074 Sw(within run): 0.070 S/Sw: 1.04

s.d.(CD) S(between runs): 0.031 Sw(within run): 0.025 S/Sw: 1.23

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55	-	10.45	for	A+B
5.70	-	6.30	for	A-B
2.30	-	2.70	for	C+D
1.37	-	1.63	for	C-D

DUPLICATES:

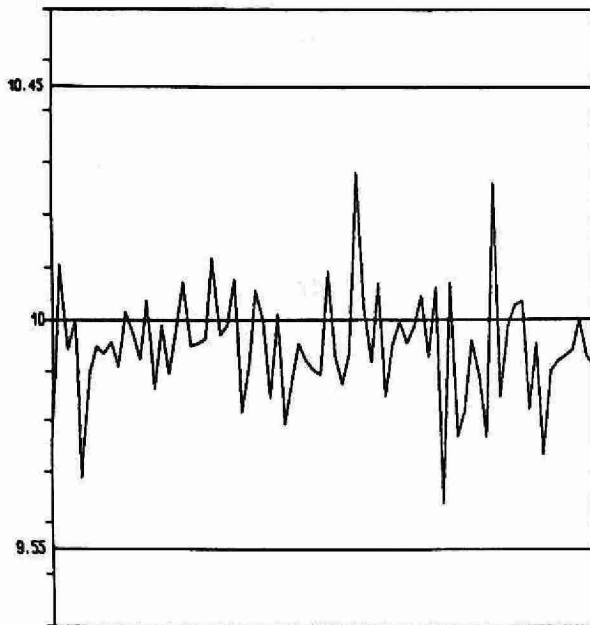
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
77	0.00	- 1.00	0.0169	4.5
34	1.00	- 4.00	0.0652	3.1
22	4.00	- 7.00	0.1149	1.8
29	7.00	- 10.00	0.0895	1.0
162	Overall		0.0528	

OTHER CHECKS:

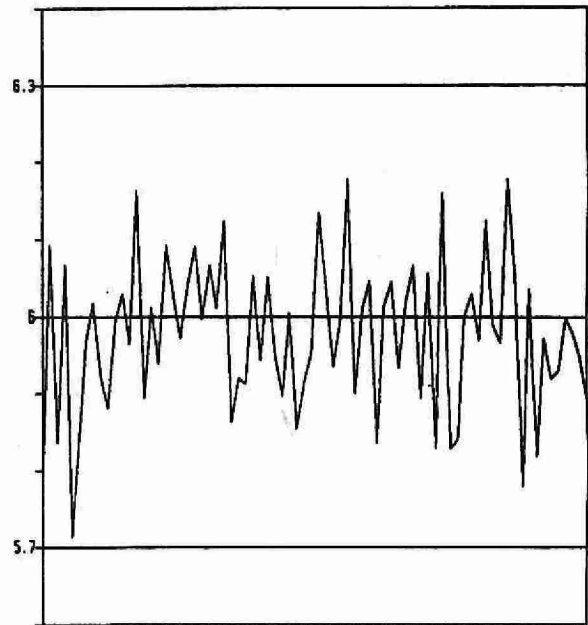
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	76	0.0116	0.0731

MAGNESIUM (mg/L as Mg)

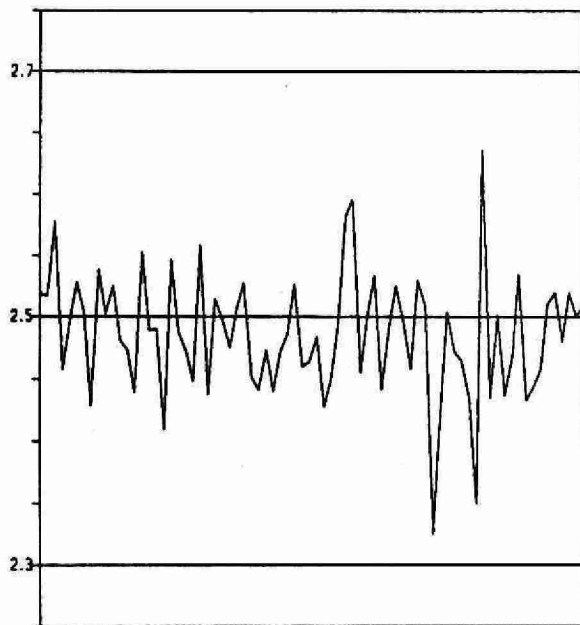
QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91



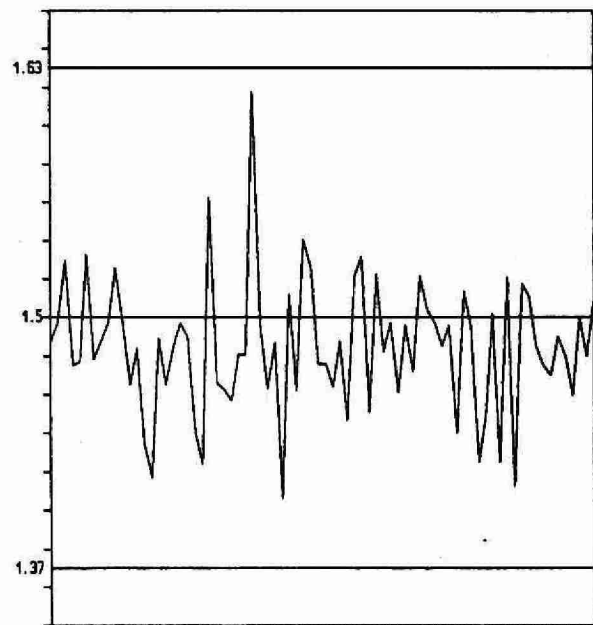
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: WAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 1.187 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

NOTES:

Control limits were exceeded when a problem developed with injection timing. Corrective action was taken and optimization of the system was conducted by using a coloured dye solution to determine mid range of sample slug. Random selection of samples were re-analyzed to determine if the results were comparable after instrument optimization. The initial results were found acceptable based upon duplicate criteria.

MAGNESIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 20/12/91

Lab: Atomic Absorption

Analytical Range: - to 50.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	125	40.0	39.95	-0.05	0.6272
B :	125	10.0	9.98	-0.02	0.2043
A+B :	125	50.0	49.93	-0.07	0.6738
A-B :	125	30.0	29.97	-0.03	0.6443
C :	125	10.0	9.98	-0.02	0.2043
D :	125	2.5	2.503	0.003	0.0930
C+D :	125	12.5	12.48	-0.02	0.2489
C-D :	125	7.5	7.48	-0.02	0.2016

s.d.(AB) S(between runs): 0.47 Sw(within run): 0.46 S/Sw:1.02

s.d.(CD) S(between runs): 0.16 Sw(within run): 0.14 S/Sw:1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8	-	52.2	for	A+B
28.5	-	31.5	for	A-B
11.4	-	13.6	for	C+D
6.8	-	8.2	for	C-D

DUPLICATES:

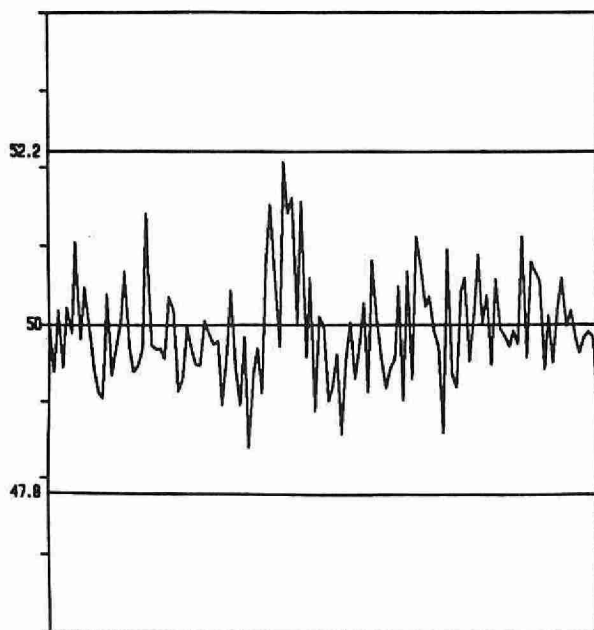
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
73	0.00	-	5.00	0.0928	4.3
77	5.00	-	10.00	0.1818	2.2
122	10.00	-	25.00	0.3130	1.9
67	25.00	-	50.00	0.5231	1.7
339	Overall			0.2624	

OTHER CHECKS:

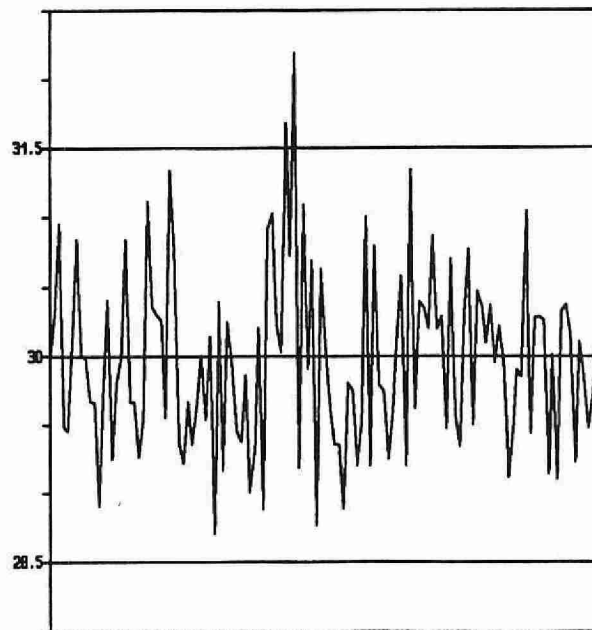
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	125	0.0020	0.2639

MAGNESIUM (mg/L as Mg)

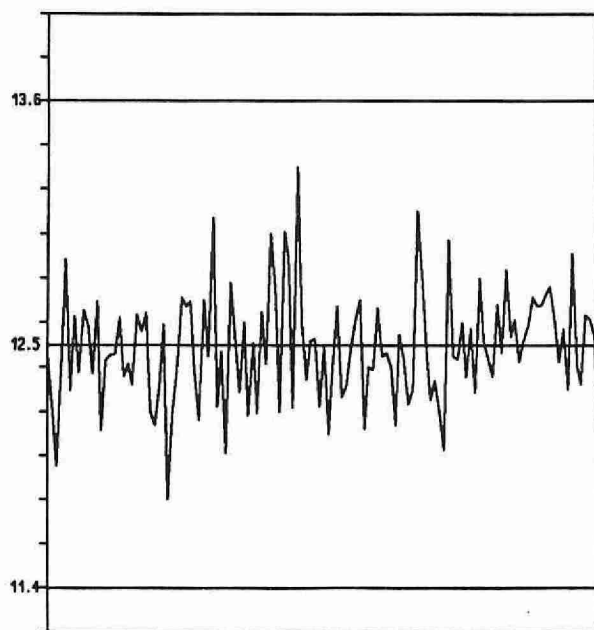
QUALITY CONTROL DATA FROM 02/01/91 TO 20/12/91



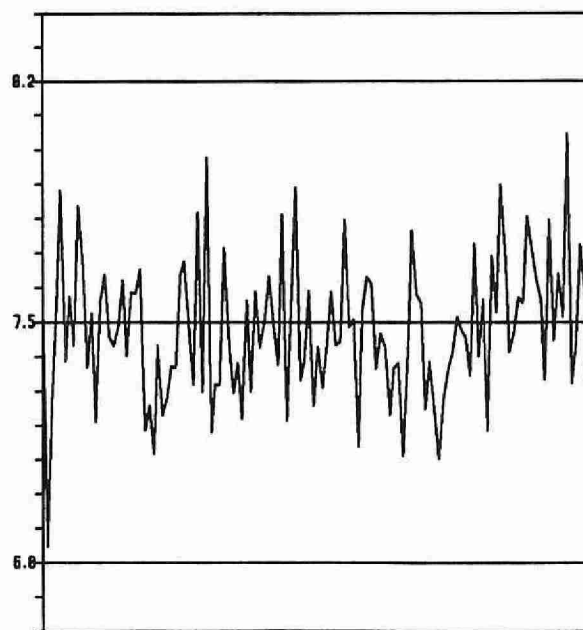
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** MAGNESIUM, EXCHANGEABLE CATIONS *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: MGESC	Units	: meq/100 g
Work Station Code	: DOLOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Mg by AAS at 285.2 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level.

Aluminum, calcium, and potassium are determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).

Drift: BL plus 1 standard (100% Full Scale) every 10 samples.

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

MAGNESIUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 07/01/91 TO 14/01/91

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	1.88	1.905	0.025	0.0370
B :	4	0.63	0.593	-0.038	0.0263
A+B :	4	2.50	2.498	-0.003	0.0580
A-B :	4	1.25	1.313	0.063	0.0275

s.d.(AB) S(between runs): 0.032 Sw(within run): 0.019 S/Sw: 1.65

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 - 2.69 for A+B
1.13 - 1.37 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	0.648	0.0580
R2 :	4	0.500	0.0115
R3 :	4	0.135	0.0420

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.00 - 1.00	0.0098	2.4
2	1.00 - 2.50	N.A.	N.A.
6	Overall	0.0336	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	4	0.000	0.000

***** MANGANESE, ACID AMMONIUM OXALATE EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: MNEOX	Units	: % by wt as Mn
Work Station Code	: DOMETOX	Unit Code	: 070825
Method Code	: 302AA5	Supervisor	: A. Neary
Method Reference No.	: E3032A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2mm. A subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

- Varian AA 1275 with programmable sample changer and Gilson Minipuls II pump.
- Balance accurate to 0.001g.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil samples, 2 method blanks, 2 QC solutions at 25% and 75% of scale, round robin ECSS samples.
Drift : BL plus 1 standard (100% F.S.) every 10 samples.

MANGANESE, ACID AMMONIUM OXALATE EXTRACTABLE

QUALITY CONTROL DATA FROM 11/02/91 TO 13/02/91

Lab: Dorset Soils

Analytical Range: - to 0.10 % as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	0.075	0.077	0.002	0.0006
B :	3	0.025	0.027	0.002	0.0006
A+B :	3	0.100	0.103	0.003	0.0006
A-B :	3	0.050	0.050	0.000	0.0010

s.d.(AB) S(between run): 0.0006 Sw(within runs): 0.0007 S/Sw: 0.82

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.085 - 0.115 for A+B
0.040 - 0.060 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.101	0.001
R2 :	3	0.014	0.001
R3 :	3	0.004	0.002

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.000 - 0.020	0.0008	83.32
0	0.020 - 0.050	N.A.	N.A.
0	0.050 - 0.100	N.A.	N.A.
6	Overall	0.0008	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	3	0	0

*** MANGANESE, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: MNEDI	Units	: % by wt. Mn
Work Station Code	: DOMETDI	Unit Code	: 070825
Method Code	: 301AA5	Supervisor	: A. Neary
Method Reference No.	: E3031A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500um (35 mesh)

ANALYTICAL PROCEDURE:

Manganese is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 279.5 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron and Aluminum may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; two QC solutions at 25% and 75% of full scale, 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

MANGANESE, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE

QUALITY CONTROL DATA FROM 21/01/91 TO 25/01/91

Lab: Dorset Soils

Analytical Range: - to 0.1 % by wt. Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	0.075	0.0750	0.000	0.0010
B :	3	0.025	0.0243	-0.0007	0.0006
A+B :	3	0.100	0.0993	-0.0007	0.0011
A-B :	3	0.050	0.0507	0.0007	0.0011

s.d.(AB) S(between runs): 0.0008 Sw(within run): 0.0008 S/Sw: 1.0

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.1067	0.0006
R2 :	3	0.0123	0.0006
R3 :	3	0.0027	0.0006

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.000 - 0.005	0.0007	48.8
0	0.005 - 0.020	N.A.	N.A.
0	0.020 - 0.100	N.A.	N.A.
9	Overall	0.0007	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.00033	0.00058

*** MANGANESE, SODIUM PYROPHOSPHATE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: MNEPY	Units	: % by wt.Mn
Work Station Code	: DOMETALX	Unit Code	: 070825
Method Code	: 703AA5	Supervisor	: A. Neary
Method Reference No.	: E3030A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to < 2mm. A subsample is ground to <500um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 279.5 nm with an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale level
Aluminum and iron may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of scale; 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

MANGANESE, SODIUM PYROPHOSPHATE EXTRACTABLE

QUALITY CONTROL DATA FROM 15/01/91 TO 17/01/91

Lab: Dorset Soils

Analytical Range: - to 0.05 % by wt. Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	0.0375	0.0377	0.0002	0.00058
B :	3	0.0125	0.0123	-0.0002	0.00058
A+B :	3	0.0500	0.0500	0.0000	0.00100
A-B :	3	0.0250	0.0253	-0.0003	0.00058

s.d.(AB) S(between runs): 0.0006 Sw(within run): 0.0004 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.046 - 0.054 for A+B
0.023 - 0.027 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.061	0.00173
R2 :	3	0.003	0.00058
R3 :	3	0.001	0.00000

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.000 - 0.010	0.0005	133.3
1	0.010 - 0.025	N.A.	N.A.
0	0.025 - 0.050	N.A.	N.A.
9	Overall	0.0006	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.000	0.000

*** MANGANESE, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: MNUT	Units	: ug/L
Work Station Code	: DOFEMN	Unit Code	: 063825
Method Code	: 504BC2	Supervisor	: A. Neary
Method Reference No.	: E3303A		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required	: 25mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO ₃

ANALYTICAL PROCEDURE:

An undigested sample is introduced to an in-line UV digester. An ammonium buffer is added, formaldoxime complexes with Mn to develop a colour the intensity of which is proportional to the concentration of Mn in the sample. EDTA is then added to complex interferences. The color is read at 480nm. A reference channel is used to counter the effects of residual natural colour in the sample. In the reference channel the EDTA is added prior to the addition of colour reagent.

INSTRUMENTATION:

- An AAII autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

Blank, plus 4 standards.

CONTROLS:

Calibration	: blank, plus 1 standard every 10 samples.
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MANGANESE, TOTAL

QUALITY CONTROL DATA FROM 08/07/91 TO 19/12/91

Lab: Dorset

Analytical Range: - to 200.0 ug/L as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	50	160.0	160.02	0.02	1.020
B :	50	40.0	40.0	0.00	0.756
A+B :	50	200.0	200.02	0.02	1.450
A-B :	50	120.0	120.02	0.02	1.059

s.d.(AB) S(between runs): 0.90 Sw(within run): 0.75 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

196 - 204 for A+B
117 - 123 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	50	160.0	158.22	0.94
R2 :	50	40.0	39.76	0.94

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
51	0.0 - 40.0	0.97	5.1
33	40.0 - 100.0	1.68	3.0
11	100.0 - 200.0	1.69	1.2
95	Overall	1.26	

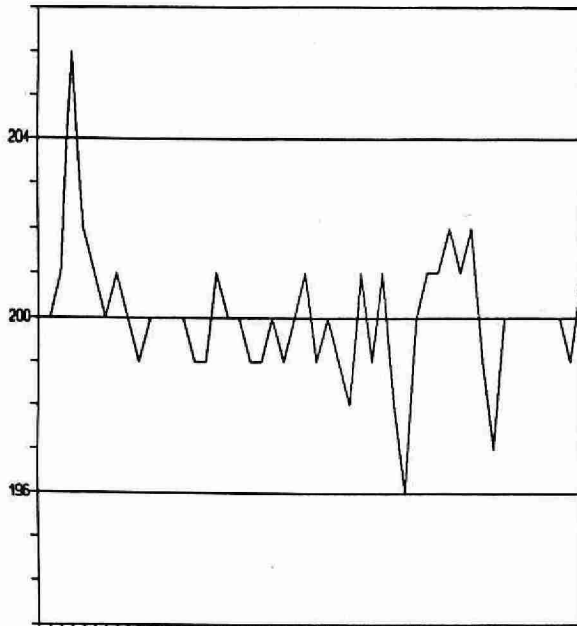
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	50	0.012	0.264
Digested Blank	50	0.094	0.260

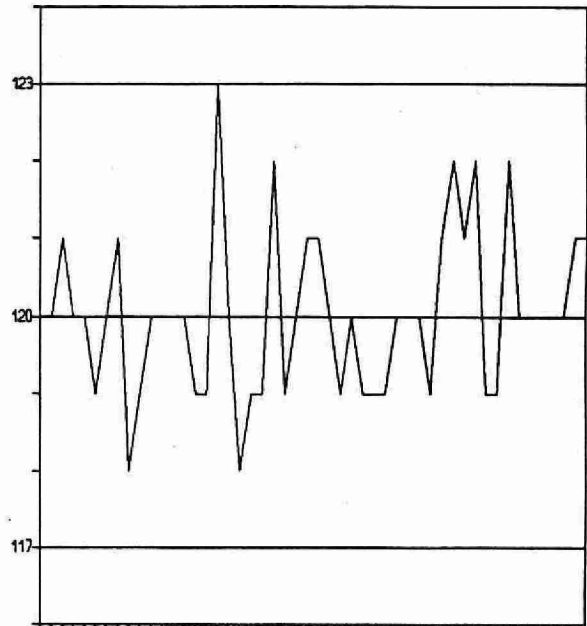
MANGANESE TOTAL

(ug/L as Mn)

QUALITY CONTROL DATA FROM 08/07/91 TO 19/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** NICKEL, ACID-EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: NIUT	Units	: ug/g as Ni
Work Station Code	: DOHMT	Unit Code	: 073828
Method Code	: 551AA1	Supervisor	: A. Neary
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm. A subsample is ground to <500um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Ni by AAS at 232.0 nm using an air-acetylene flame.

Approximate absorbance: 0.2 at the full scale value.

Copper, lead and zinc are also determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3

Calculated W value: 0.2

T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types, 2 method blanks and one judiciously blended sample extract run with each run.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

NICKEL, ACID-EXTRACTABLE

QUALITY CONTROL DATA FROM 21/02/91 TO 23/02/91

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g as Ni

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	36.30	33.87	-2.43	0.451
B :	3	13.50	12.80	-0.70	1.552
A+B :	3	49.80	46.67	-3.13	1.779
A-B :	3	22.80	21.07	-1.73	1.436

s.d.(AB) S(between runs): 1.14 Sw(within run): 1.02 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.3 - 57.3 for A+B
17.8 - 27.8 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	5.17	1.779
R2 :	3	24.37	1.504
R3 :	3	4.90	0.854

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.00 - 10.00	0.956	10.4
3	10.00 - 25.00	1.104	8.0
0	25.00 - 50.00	N.A.	N.A.
9	Overall	1.008	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blanks	3	0.00	0.000

***** NITROGEN, AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: NNHTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1524C2	Supervisor	: A. Neary
Method Reference No.	: E3033A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance : 0.40 at the full scale level.

Nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3

Current W value: 1

T value: 5

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration : LTBL plus 4 QC standards, e.g. QCA

Drift : BL every 10 samples and BL plus check standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 04/01/91 TO 11/12/91

Lab: Dorset

Analytical Range: - to 1000 ug/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	95	750.0	748.5	-1.5	5.77
B :	95	250.0	248.1	-1.9	5.64
A+B :	95	1000.0	996.6	-3.4	9.88
A-B :	95	500.0	500.4	0.4	5.70
C :	95	75.0	75.1	0.1	3.65
D :	95	25.0	24.8	-0.2	2.59
C+D :	95	100.0	99.9	-0.1	5.62
C-D :	95	50.0	50.3	0.3	2.93

s.d.(AB) S(between runs): 5.7 Sw(within run): 4.0 S/Sw: 1.4

s.d.(AB) S(between runs): 3.2 Sw(within run): 2.1 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

970	-	1030	for	A+B
480	-	520	for	A-B
88	-	112	for	C+D
42	-	58	for	C-D

DUPLICATES:

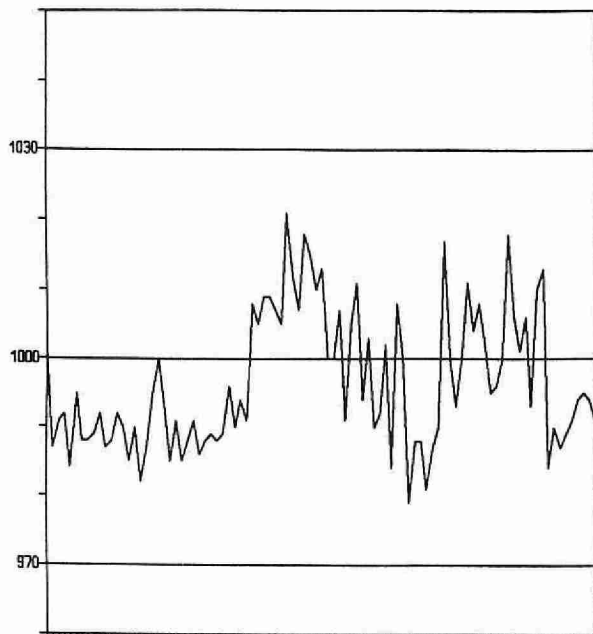
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
190	0.0	-	25.0	1.27	17.2
29	25.0	-	50.0	1.67	6.2
36	50.0	-	250.0	2.91	3.6
14	250.0	-	500.0	2.96	1.0
7	500.0	-	1000.0	5.07	0.7
276	Overall			1.65	

OTHER CHECKS:

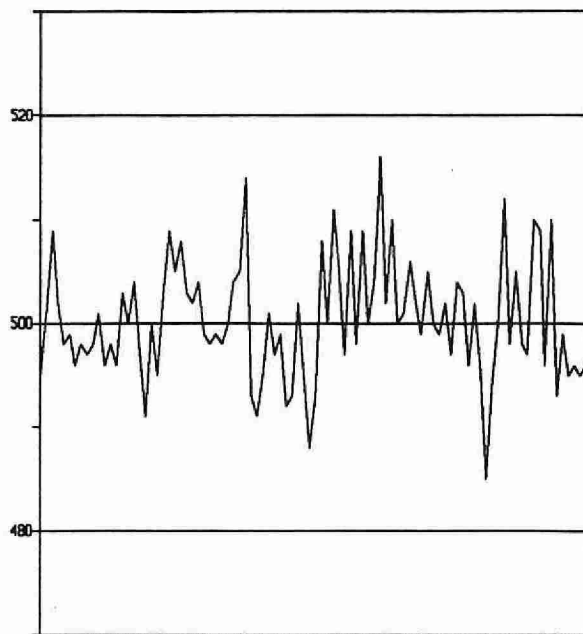
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	95	0.210	1.020
Reference Check	81	197.1	4.974

NITROGEN, AMMONIA PLUS AMMONIUM (ug/L as N)

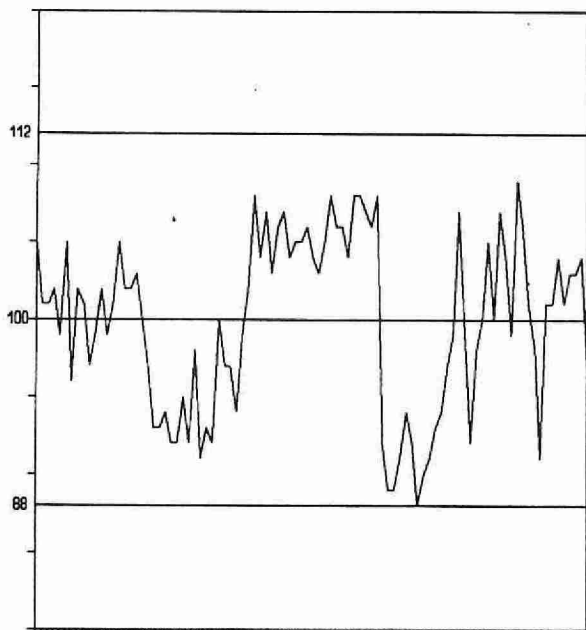
QUALITY CONTROL DATA FROM 04/01/91 TO 11/12/91



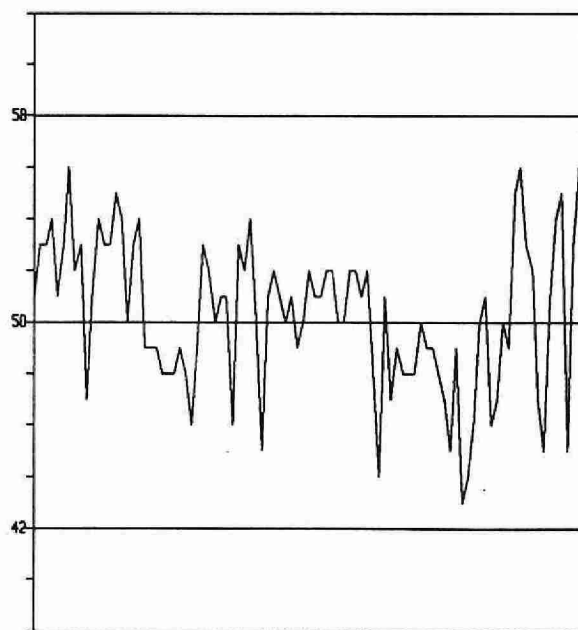
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** NITROGEN, AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR	Units	: ug/fltr as N
Work Station Code	: PRAM	Unit Code	: 361807
Method Code	: 004AI1	Supervisor	: M. Rawlings
Method Reference No.	: E3149A		
Sample Type/Matrix	: Dry deposition air filter extracts		

SAMPLING:

Quantity Required	: 10 mL
Container	: 50 mL Polyethylene tube

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on an extract from a dry deposition air filter via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for precipitation, throughfall, and stemflow samples is also determined at this work station.

Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples.

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91

Lab: Colourimetry

Analytical Range: - to 50.0 ug/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	72	40	40.23	0.23	0.358
B :	72	20	20.02	0.02	0.185
A+B :	72	60	60.24	0.24	0.411
A-B :	72	20	20.21	0.21	0.394
C :	72	20	20.02	0.02	0.185
D :	72	4	4.07	0.07	0.166
C+D :	72	24	24.09	0.09	0.271
C-D :	72	16	15.94	-0.06	0.223

s.d.(AB) S(between runs): 0.28 Sw(within run): 0.28 S/Sw: 1.0

s.d.(CD) S(between runs): 0.18 Sw(within run): 0.16 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.0	-	25.0	for	C+D
15.4	-	16.6	for	C-D

DUPLICATES:

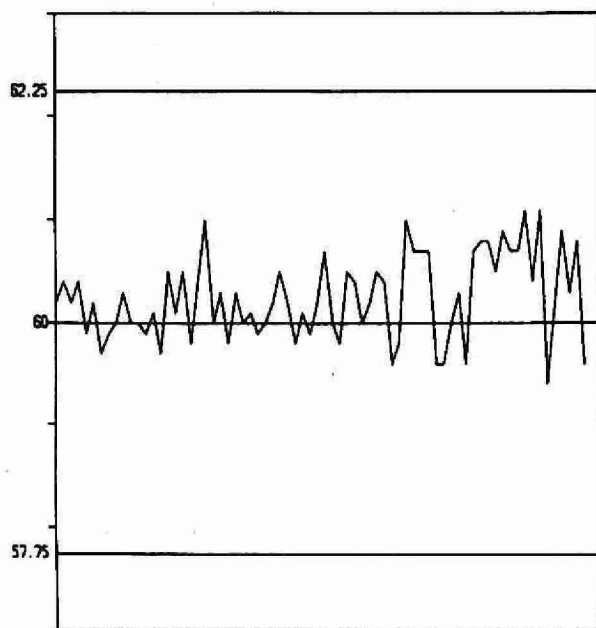
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
56	0.00	-	5.00	0.084	4.1
51	5.00	-	10.00	0.098	1.3
87	10.00	-	50.00	0.096	0.6
194	Overall			0.094	

OTHER CHECKS:

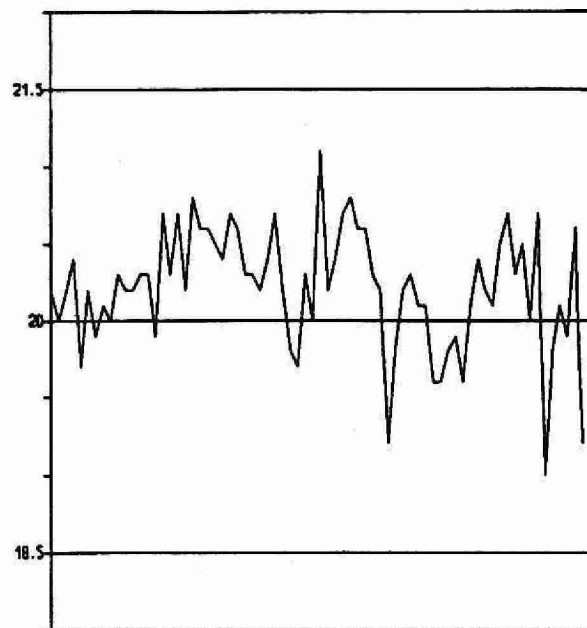
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	72	-0.084	0.113

NITROGEN, AMMONIA PLUS AMMONIUM (ug/filter as N)

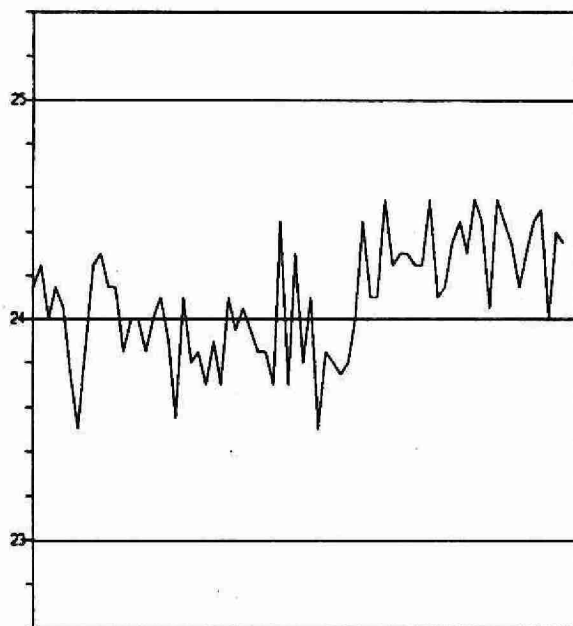
QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91



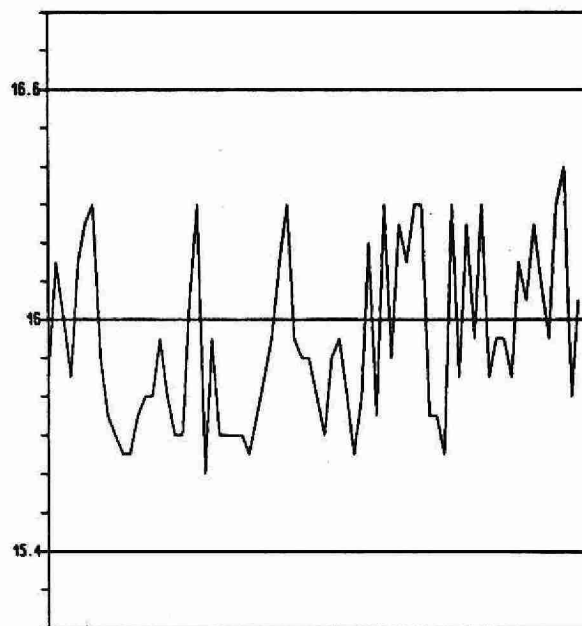
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR, NNHTUR	Units	: mg/L as N
Work Station Code	: PRAM	Unit Code	: 064807
Method Code	: 103CC3, 003CC3	Supervisor	: M. Rawlings
Method Reference No.	: E3149A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for dry deposition air filter extracts is also determined at this work station.

Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5cm light path at 630 nm. Data capture, reduction and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.002

T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples

**NITROGEN, AMMONIA PLUS AMMONIUM
(NNHTFR)**

QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	72	1.60	1.608	0.008	0.0144
B :	72	0.80	0.7996	-0.0004	0.0073
A+B :	72	2.40	2.407	0.007	0.0170
A-B :	72	0.80	0.808	0.008	0.0153
C :	72	0.80	0.7996	-0.0004	0.0073
D :	72	0.16	0.163	0.003	0.0066
C+D :	72	0.96	0.963	0.003	0.0108
C-D :	72	0.64	0.637	-0.003	0.0089

s.d.(AB) S(between runs): 0.011 Sw(within run): 0.011 S/Sw: 1.05

s.d.(CD) S(between runs): 0.007 Sw(within run): 0.006 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.616	-	0.664	for	C-D

DUPLICATES:

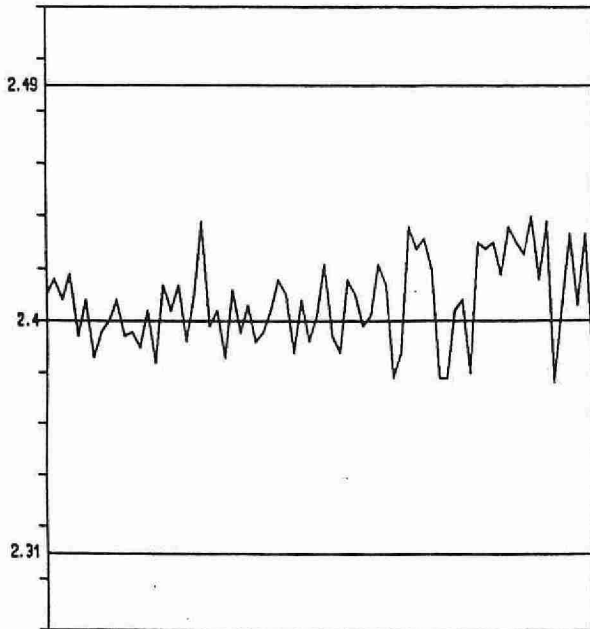
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
57	0.00	-	0.20	0.0033	3.5
116	0.20	-	1.00	0.0035	0.8
20	1.00	-	2.00	0.0076	0.6
193	Overall			0.0038	

OTHER CHECKS:

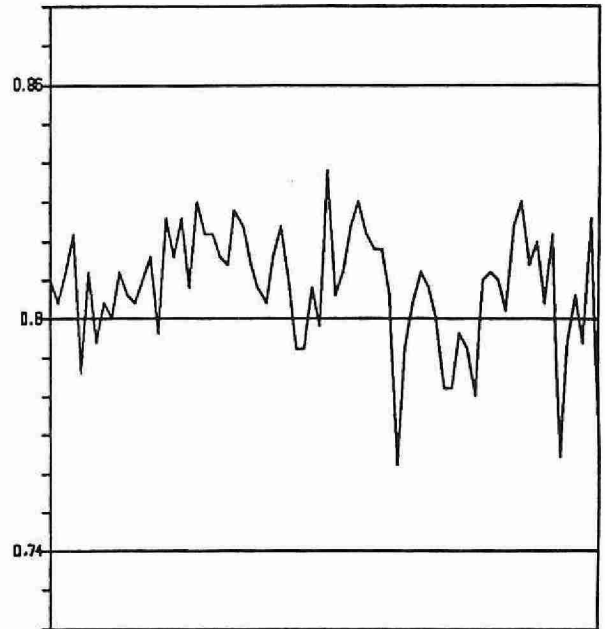
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	72	-0.0034	0.0045

NITROGEN, AMMONIA (mg/L as N)
(NNHTFR)

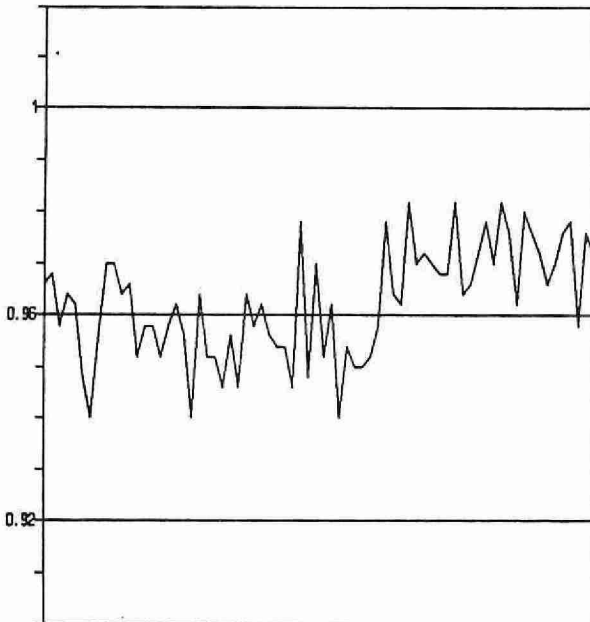
QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91



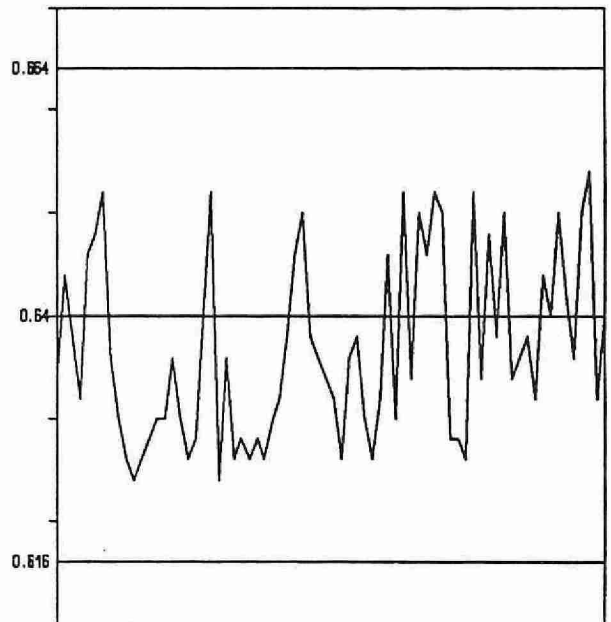
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

NITROGEN, AMMONIA PLUS AMMONIUM (NNHTUR)

QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	72	1.6	1.608	0.008	0.0144
B :	72	0.8	0.7996	-0.0004	0.0073
A+B :	72	2.4	2.407	0.007	0.0170
A-B :	72	0.8	0.808	0.008	0.0153
C :	72	0.8	0.7996	-0.0004	0.0073
D :	72	0.16	0.163	0.003	0.0066
C+D :	72	0.96	0.963	0.003	0.0108
C-D :	72	0.64	0.637	-0.003	0.0089

s.d.(AB) S(between runs): 0.011 Sw(within run): 0.011 S/Sw: 1.05

s.d.(CD) S(between runs): 0.007 Sw(within run): 0.006 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.616	-	0.664	for	C-D

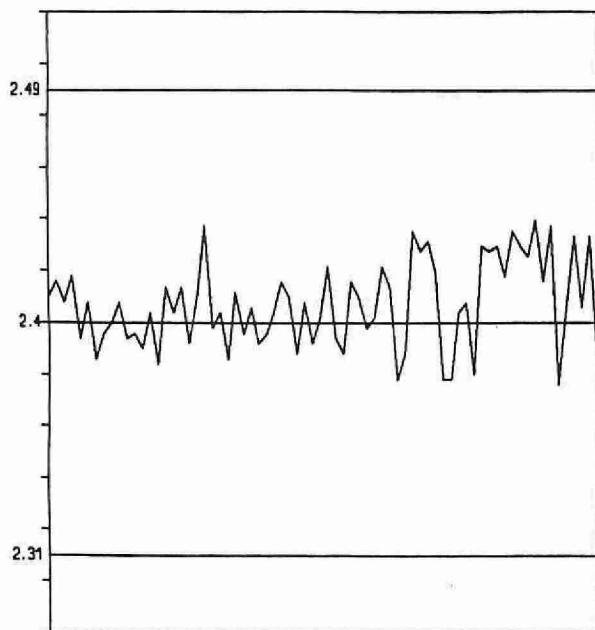
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
57	0.00 - 0.20	0.0033	3.5
116	0.20 - 1.00	0.0035	0.8
20	1.00 - 2.00	0.0076	0.6
193	Overall	0.0038	

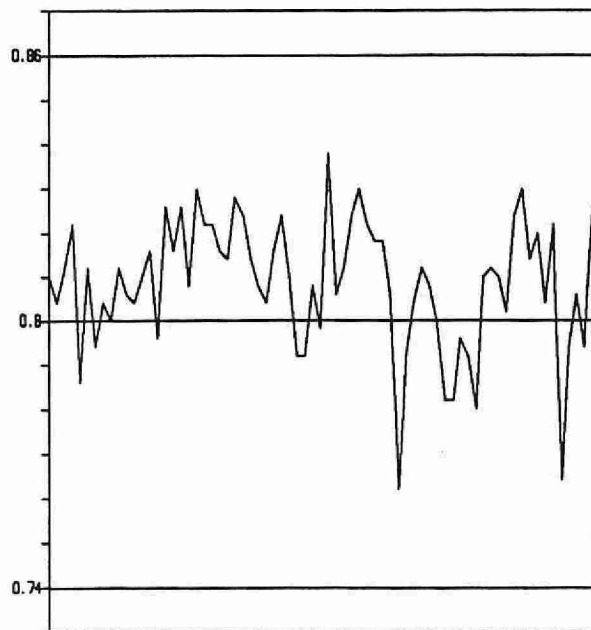
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	72	-0.0034	0.0045

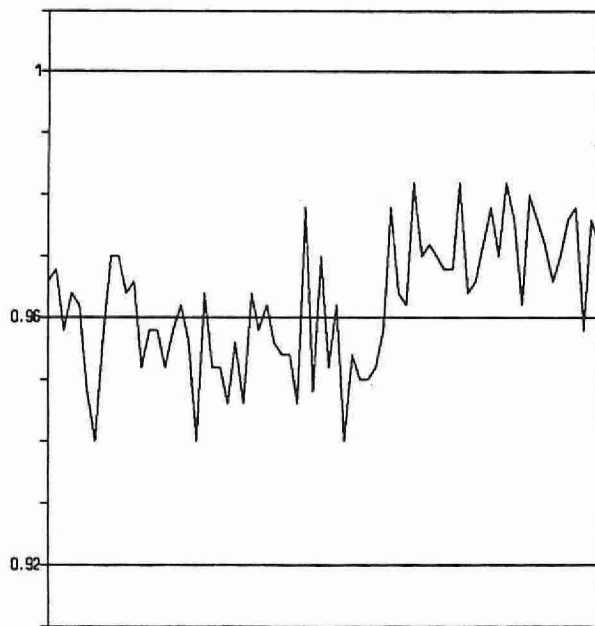
NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)
 (NNHTUR)
 QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91



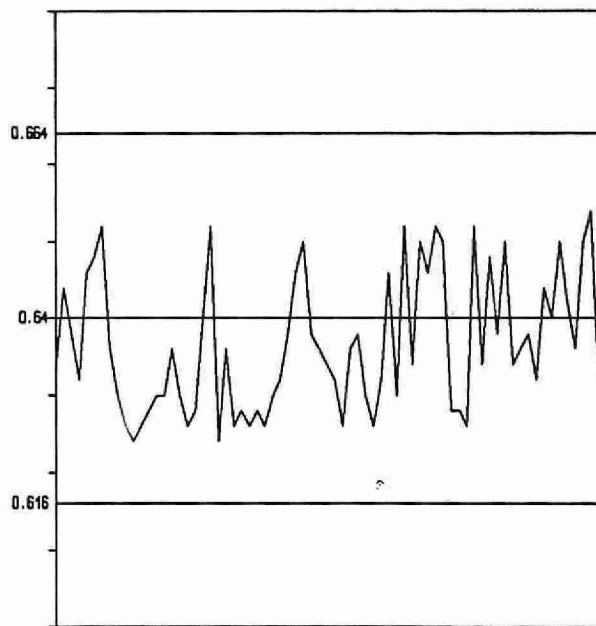
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** NITROGEN, AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3174A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance: 0.5 at the full scale level.

Nitrate plus nitrite, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.002	T value: 0.01
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	104	1.6	1.608	0.008	0.0142
B :	104	0.8	0.802	0.002	0.0100
A+B :	104	2.4	2.410	0.010	0.0177
A-B :	104	0.8	0.806	0.006	0.0171
C :	104	0.8	0.802	0.002	0.0100
D :	104	0.16	0.160	0.000	0.0046
C+D :	104	0.96	0.962	0.002	0.0123
C-D :	104	0.64	0.642	0.002	0.0096

s.d.(AB) S(between run): 0.013 Sw(within runs): 0.012 S/Sw: 1.02

s.d.(CD) S(between run): 0.008 Sw(within runs): 0.007 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.0	for	C+D
0.616	-	0.664	for	C-D

DUPLICATES:

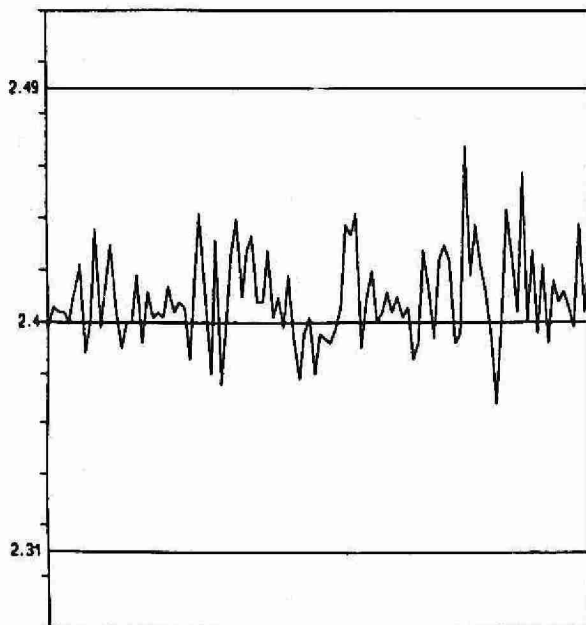
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
141	0.00	-	0.02	0.003	52.9
110	0.02	-	0.20	0.006	16.7
23	0.20	-	1.00	0.020	3.9
5	1.00	-	2.00	0.047	2.7
279	Overall			0.005	

OTHER CHECKS:

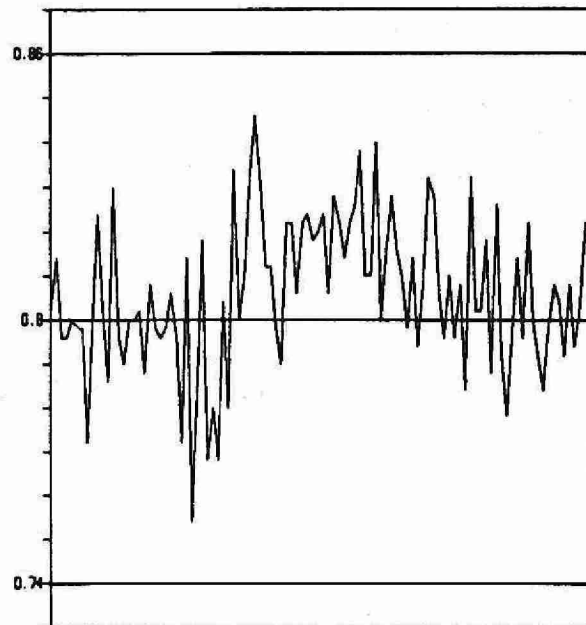
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	105	0.0010	0.0040

NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

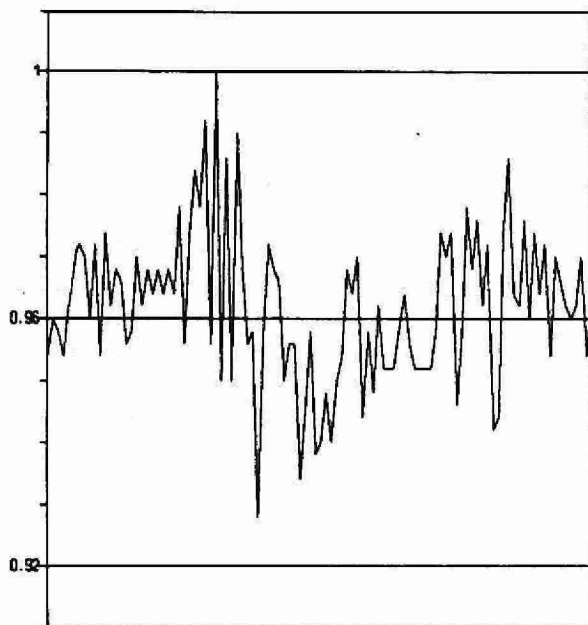
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



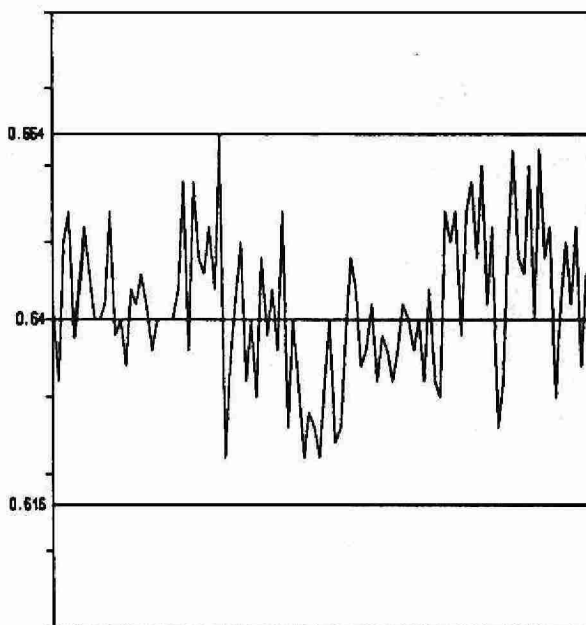
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** NITROGEN, AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/77
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 103AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3223A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.7 at the full scale level.

Reactive orthophosphate, nitrogen-nitrite and nitrogen-nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus one 38°C heating bath (7.7 mL delay).

Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	121	40.0	40.137	0.137	0.199
B :	121	20.0	20.042	0.042	0.130
A+B :	121	60.0	60.179	0.179	0.279
A-B :	121	20.0	20.095	0.095	0.189
C :	121	20.0	20.042	0.042	0.130
D :	121	4.0	3.997	-0.003	0.053
C+D :	121	24.0	24.040	0.040	0.164
C-D :	121	16.0	16.044	0.044	0.113

s.d.(AB) S(between runs): 0.168 Sw(within run): 0.133 S/Sw: 1.3

s.d.(CD) S(between runs): 0.099 Sw(within run): 0.080 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.1	-	24.9	for	C+D
15.4	-	16.6	for	C-D

DUPLICATES:

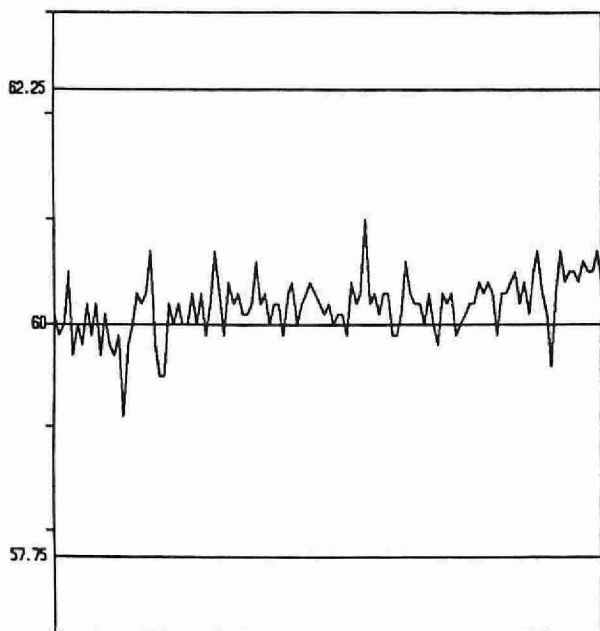
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
66	0.00	-	0.20	0.0420	88.8
17	0.20	-	2.00	0.1134	155.2
14	2.00	-	10.00	0.2107	17.4
34	10.00	-	20.00	0.4299	5.2
40	20.00	-	50.00	0.5500	20.8
241	Overall			0.2040	

OTHER CHECKS:

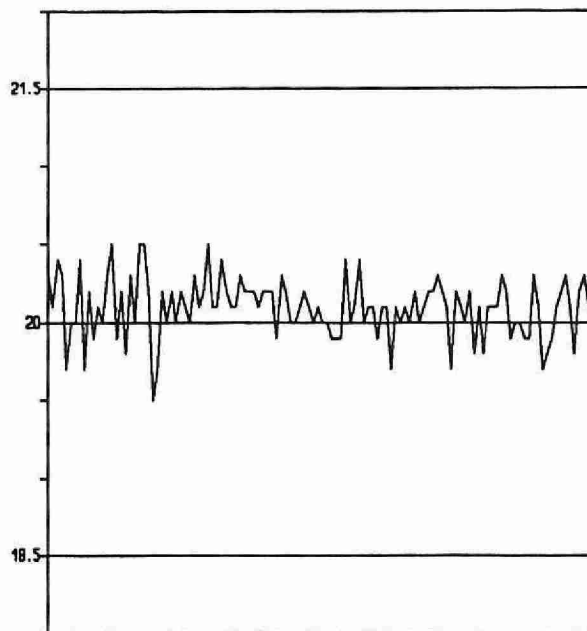
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	121	0.0157	0.031

NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

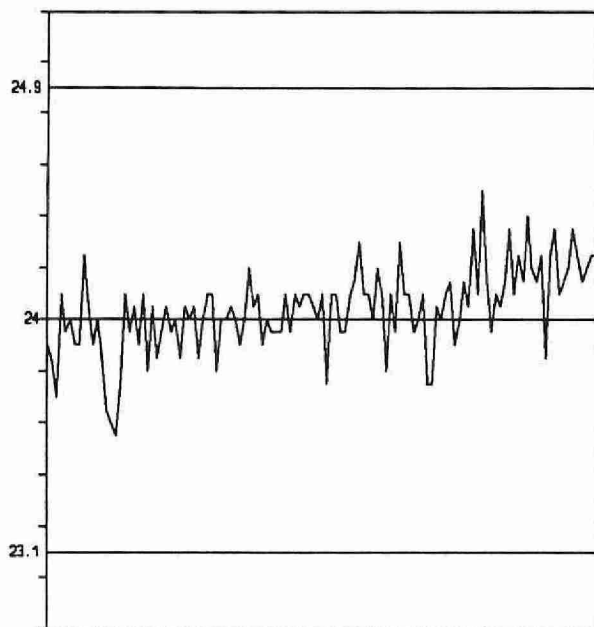
QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91



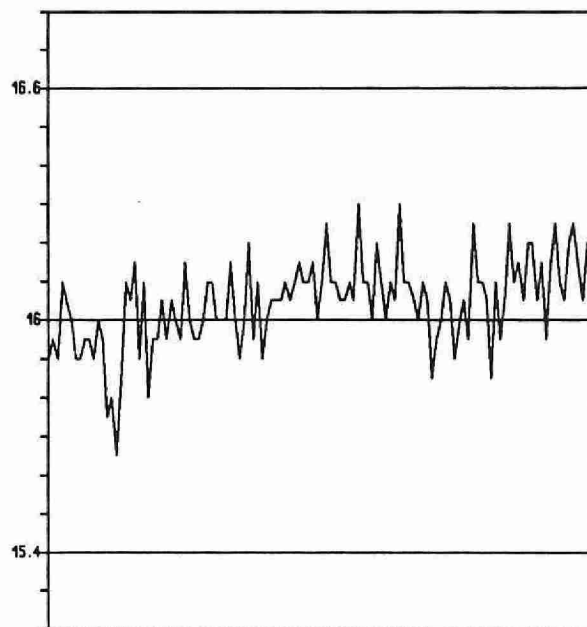
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** NITROGEN, NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO3UR	Units	: mg/L as N
Work Station Code	: PRIC1	Unit Code	: 064807
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards.
Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

NOTES:

Two analytical ranges are in operation at this work station, and subsequently, quality control results are provided for each range.

NITROGEN, NITRATE

QUALITY CONTROL DATA FROM 14/01/91 TO 18/12/91

Lab: Ion Chromatography

Analytical Range: - to 1 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	42	0.8	0.8038	0.0038	0.0077
B :	42	0.2	0.1999	-0.0001	0.0071
A+B :	42	1.0	1.0038	0.0038	0.0103
A-B :	42	0.6	0.6040	0.0040	0.0106

s.d.(AB) S(between runs): 0.0074 Sw(within run): 0.0075 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.95 - 1.05 for A+B
0.57 - 0.63 for A-B

DUPLICATES:

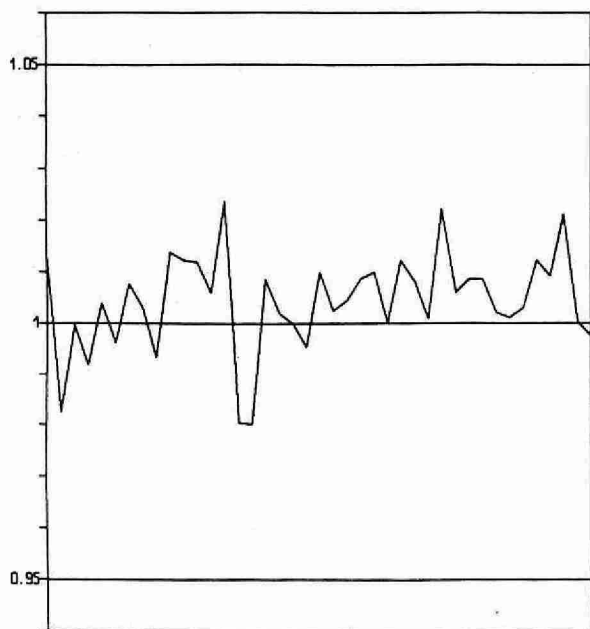
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
28	0.00	0.20	0.0055	5.9
50	0.20	0.50	0.0067	2.5
36	0.50	1.00	0.0075	1.0
114	Overall		0.0067	

OTHER CHECKS:

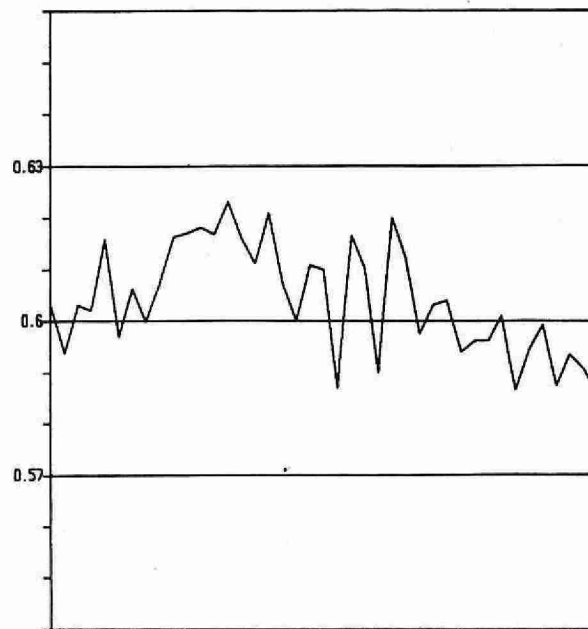
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	42	0.0081	0.0071

NITROGEN, NITRATE (mg/L as N)

QUALITY CONTROL DATA FROM 14/01/91 TO 18/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** NITROGEN, NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3UR	Units	: ug/Filter as N
Work Station Code	: PRLOV	Unit Code	: 361807
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as N. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN, NITRATE

QUALITY CONTROL DATA FROM 21/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 100 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	40	80.0	80.01	0.01	0.772
B :	40	20.0	20.21	0.21	0.576
A+B :	40	100.0	100.22	0.22	1.109
A-B :	40	60.0	59.80	-0.20	0.791

s.d.(AB) S(between runs): 0.68 Sw(within run): 0.56 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.5 - 104.5 for A+B
57.0 - 63.0 for A-B

DUPLICATES:

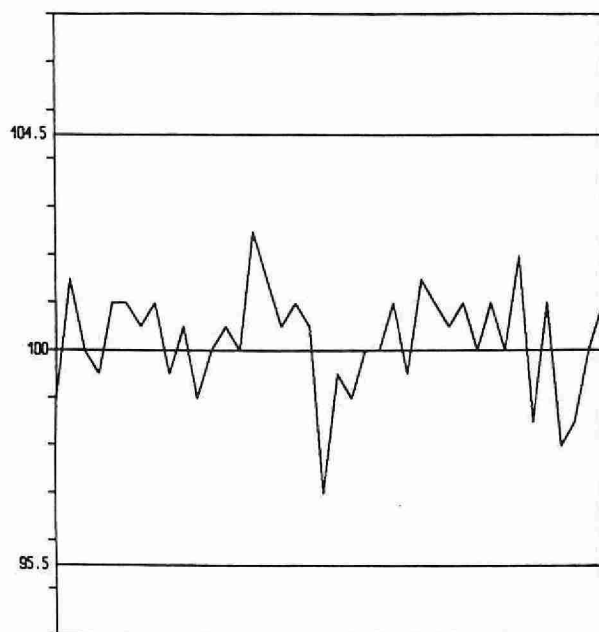
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
13	0.0 - 25.0	0.106	7.4
20	25.0 - 50.0	0.269	2.1
18	50.0 - 100.0	0.488	0.9
51	Overall	0.314	

OTHER CHECKS:

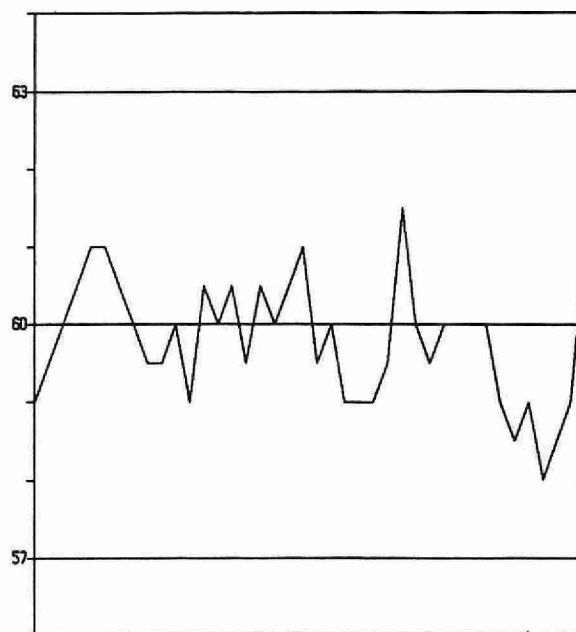
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	40	0.006	0.013

NITROGEN, NITRATE (ug/filter as N)

QUALITY CONTROL DATA FROM 21/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** NITROGEN, NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3FR,NNRICF	Units	: ug/Filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: Nylon (NNRICF) filter from LoVol and sequential filter packs, and Teflon (NN03FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as N. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN, NITRATE (NNO3FR)

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 50 ug/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	68	40.0	39.95	-0.05	0.373
B :	68	10.0	10.08	0.08	0.261
A+B :	68	50.0	50.03	0.03	0.533
A-B :	68	30.0	29.87	-0.13	0.360

s.d.(AB) S(between runs): 0.32 Sw(within run): 0.25 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 - 52.2 for A+B
28.5 - 31.5 for A-B

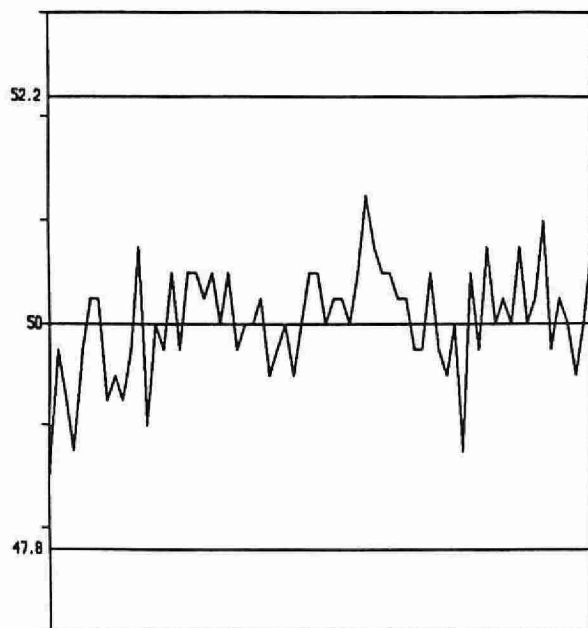
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
95	0.0	-	5.0	0.175	14.6
28	5.0	-	25.0	0.261	4.9
5	25.0	-	50.0	0.156	1.3
128	Overall			0.197	

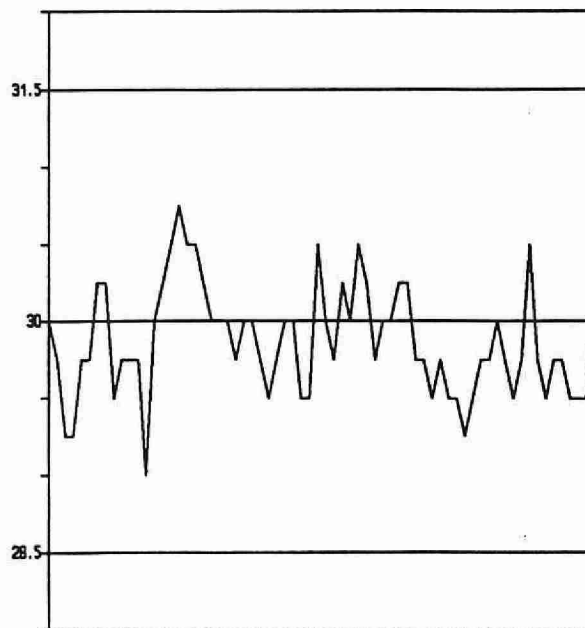
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	68	0.01	0.023

NITROGEN, NITRATE (ug/filter as N)
(NNO3FR)
QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

NITROGEN, NITRATE (NNRICF)

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 50 ug/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	69	40.0	39.96	-0.04	0.451
B :	69	10.0	10.06	0.06	0.256
A+B :	69	50.0	50.02	0.02	0.588
A-B :	69	30.0	29.89	-0.11	0.438

s.d.(AB) S(between runs): 0.37 Sw(within run): 0.31 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 - 52.2 for A+B
28.5 - 31.5 for A-B

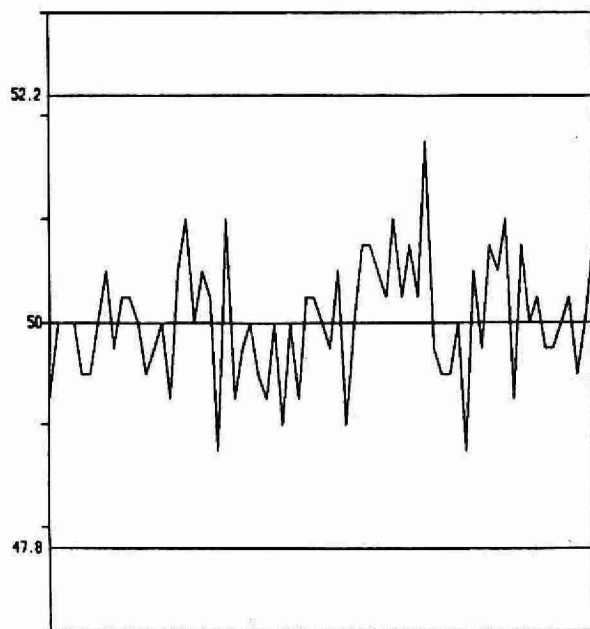
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
21	0.0	-	1.5	0.150	94.9
39	1.5	-	5.0	0.194	10.6
60	5.0	-	50.0	0.305	4.8
120	Overall			0.238	

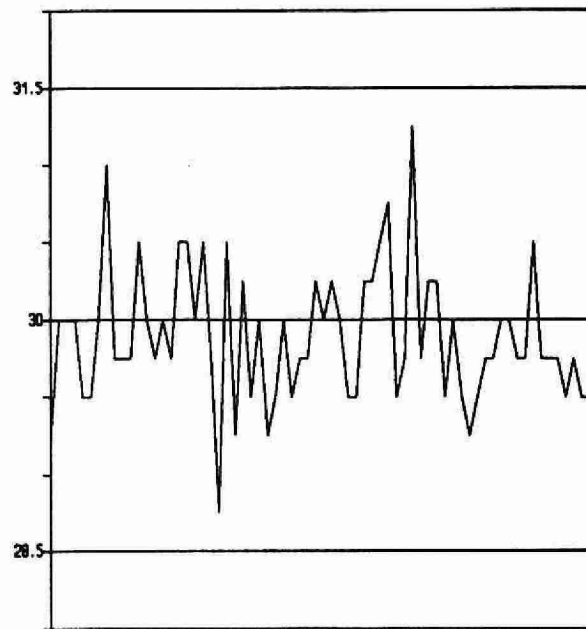
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	69	0.015	0.017

NITROGEN, NITRATE (ug/filter as N)
(NNRICF)
QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 13/06/78
LIS Test Name Code	: NNOTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1525C2	Supervisor	: A. Neary
Method Reference No.	: E303A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a sample. Nitrate is reduced to nitrite in alkaline media at 37°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance : 0.4 at the full scale level.

Ammonia plus ammonium is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 2

T value: 10

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration	: LTBL plus 4 QC standards, e.g. QCA
Drift	: BL every 10 samples and BL plus check standard every 20 samples.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 04/01/91 TO 18/12/91

Lab: Dorset

Analytical Range: - to 1000 ug/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	95	750	751.3	1.3	5.94
B :	95	250	251.0	1.0	3.54
A+B :	95	1000	1002.3	2.3	8.47
A-B :	95	500	500.2	0.2	4.90
C :	95	75	74.9	-0.1	2.09
D :	95	25	24.7	-2.3	1.25
C+D :	95	100	99.6	-0.4	2.84
C-D :	95	50	50.1	0.1	1.94

s.d.(AB) S(between runs): 2.9 Sw(within run): 3.5 S/Sw: 0.84

s.d.(CD) S(between runs): 1.7 Sw(within run): 1.9 S/Sw: 0.89

On any given day the calibration is accepted if the values obtained lie within the ranges:

970	-	1030	for	A+B
480	-	520	for	A-B
88	-	112	for	C+D
42	-	58	for	C-D

DUPLICATES:

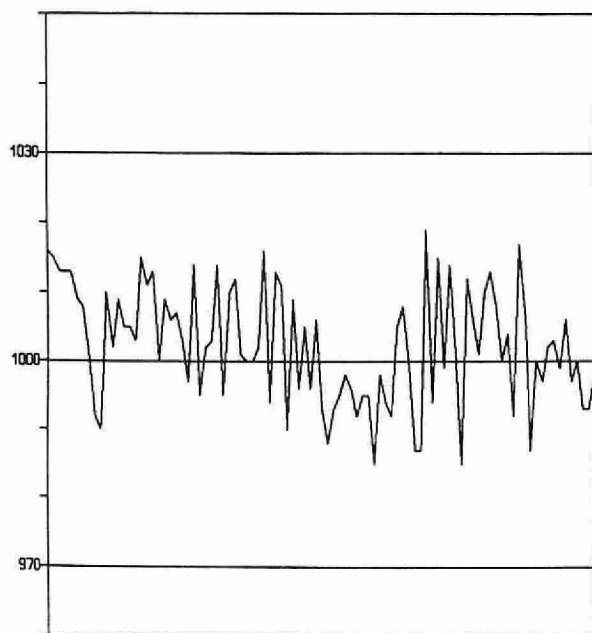
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
138	0.0	-	50.0	1.09	7.1
42	20.0	-	100.0	1.91	2.8
63	100.0	-	250.0	2.33	1.6
22	250.0	-	500.0	4.04	1.0
12	500.0	-	1000.0	8.98	2.3
277	Overall			1.80	

OTHER CHECKS:

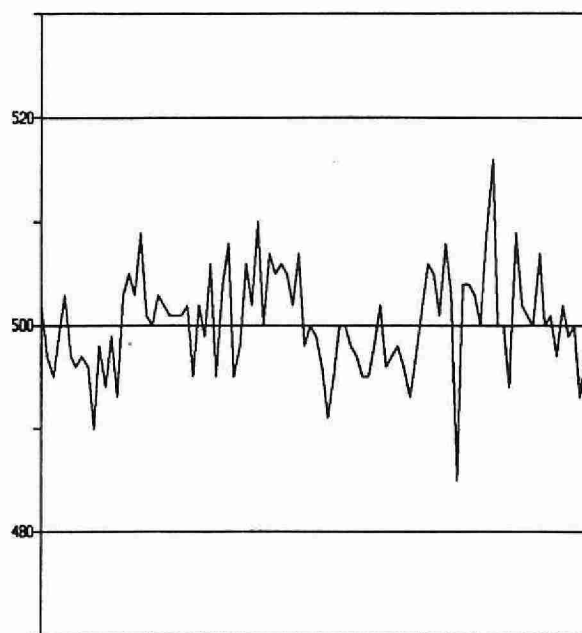
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	95	0.55	0.920

NITROGEN, NITRATE PLUS NITRITE (ug/L as N)

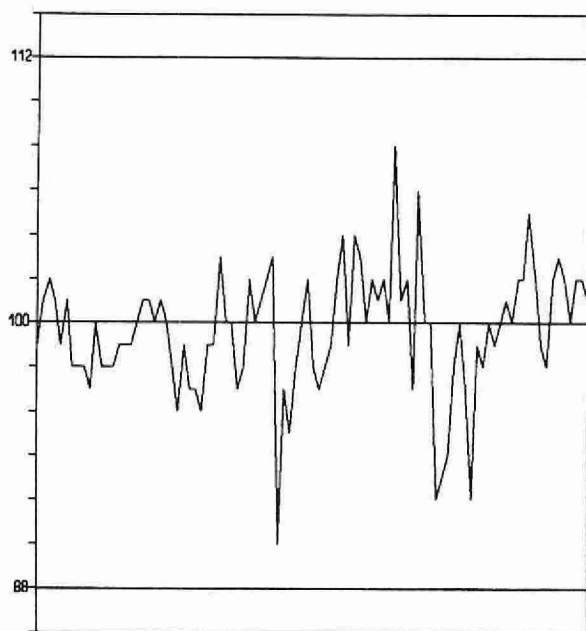
QUALITY CONTROL DATA FROM 04/01/91 TO 18/12/91



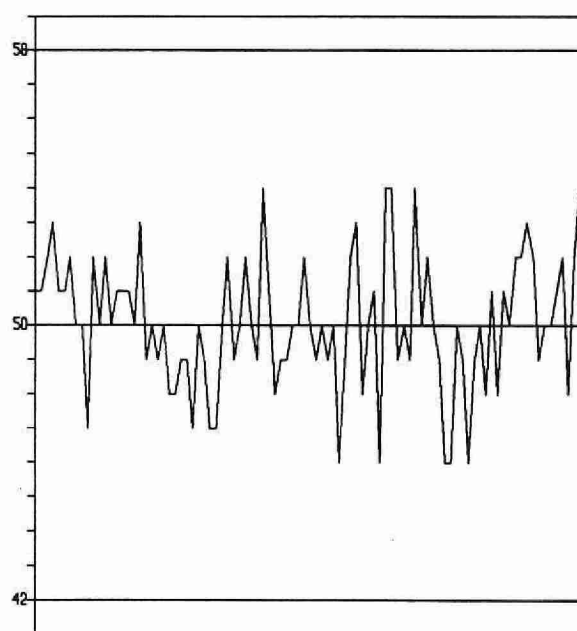
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** NITROGEN, NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3208A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.6 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 5.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	103	4.0	4.02	0.02	0.049
B :	103	2.0	2.02	0.03	0.024
A+B :	103	6.0	6.05	0.05	0.065
A-B :	103	2.0	1.998	-0.002	0.041
C :	103	2.0	2.02	0.02	0.024
D :	103	0.4	0.41	0.01	0.010
C+D :	103	2.4	2.43	0.03	0.029
C-D :	103	1.6	1.62	0.02	0.023

s.d.(AB) S(between run): 0.039 Sw(within runs): 0.029 S/Sw: 1.32

s.d.(CD) S(between run): 0.018 Sw(within runs): 0.016 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77	-	6.23	for	A+B
1.85	-	2.15	for	A-B
2.30	-	2.50	for	C+D
1.54	-	1.66	for	C-D

DUPLICATES:

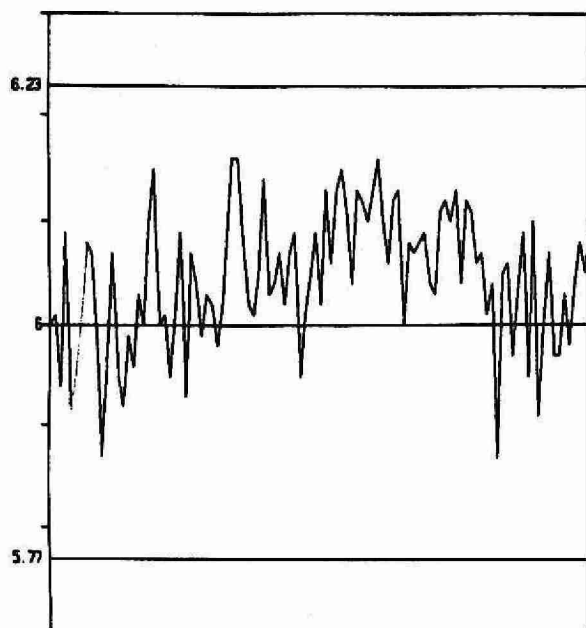
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
123	0.00	-	0.20	0.0047	21.6
101	0.20	-	1.00	0.0067	8.0
47	1.00	-	2.50	0.0211	1.5
26	2.50	-	5.00	0.0316	17.8
293	Overall			0.0087	

OTHER CHECKS:

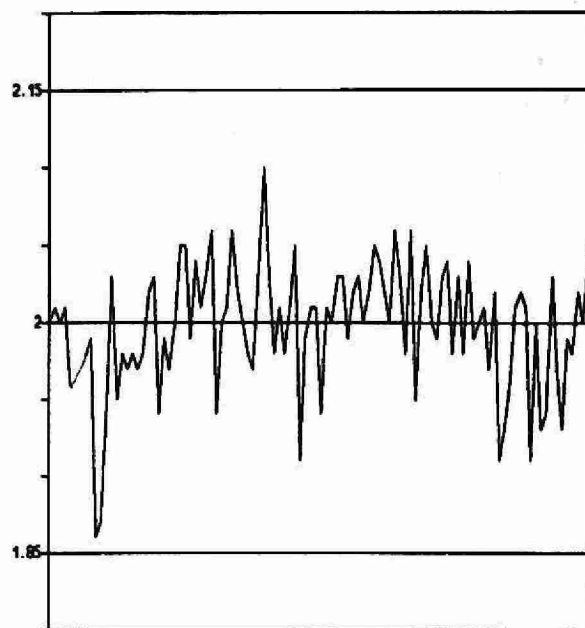
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	103	0.0014	0.0083

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

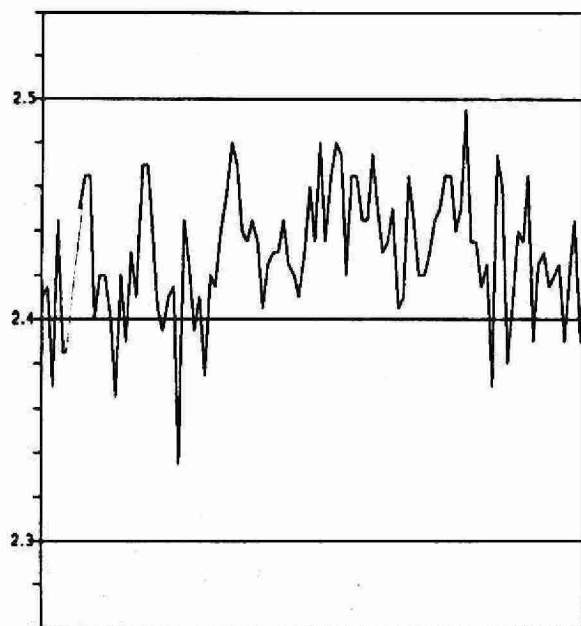
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



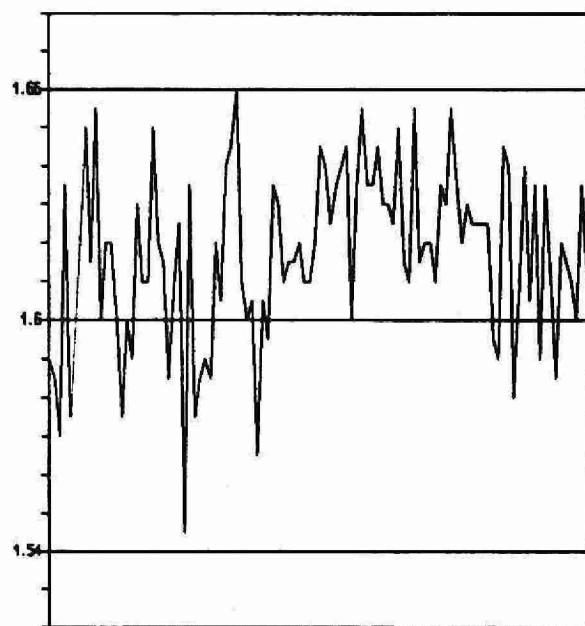
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3193A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step. Approximate absorbance: 0.7 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive phosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Two analytical ranges are obtained from the output of the colourimeter. Data capture, reduction, and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	121	40.0	40.314	0.314	0.355
B :	121	20.0	20.061	0.061	0.181
A+B :	121	60.0	60.375	0.375	0.443
A-B :	121	20.0	20.253	0.253	0.349
C :	121	20.0	20.061	0.061	0.181
D :	121	4.0	3.981	-0.019	0.057
C+D :	121	24.0	24.043	0.043	0.206
C-D :	121	16.0	16.080	0.080	0.173

s.d.(AB) S(between runs): 0.282 Sw(within run): 0.246 S/Sw: 1.14

s.d.(CD) S(between runs): 0.134 Sw(within run): 0.123 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

58.2	-	61.8	for	A+B
18.8	-	21.2	for	A-B
23.14	-	24.86	for	C+D
15.42	-	16.58	for	C-D

DUPLICATES:

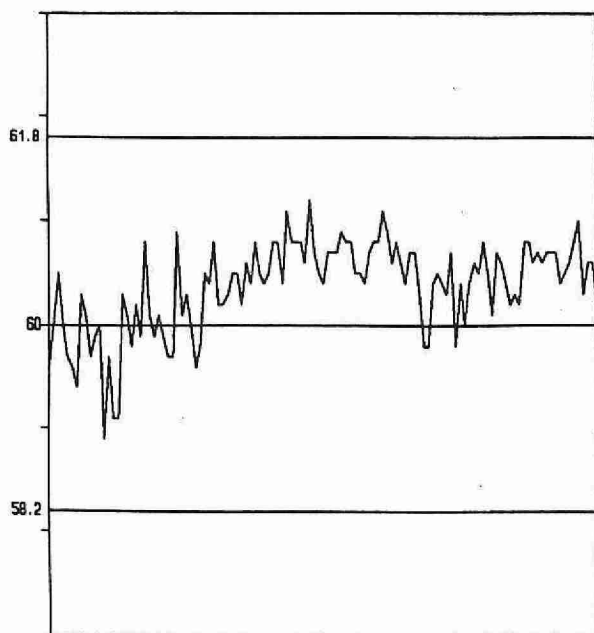
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
180	0.00	-	2.00	0.0485	18.5
35	2.00	-	5.00	0.1180	9.2
38	5.00	-	10.00	0.1377	2.2
40	10.00	-	20.00	0.2197	2.0
12	20.00	-	50.00	0.5023	1.8
305	Overall			0.0885	

OTHER CHECKS:

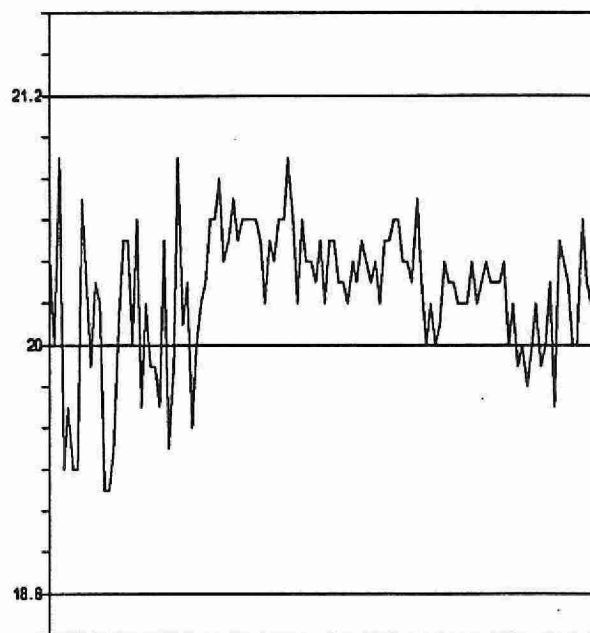
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	121	0.008	0.031

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

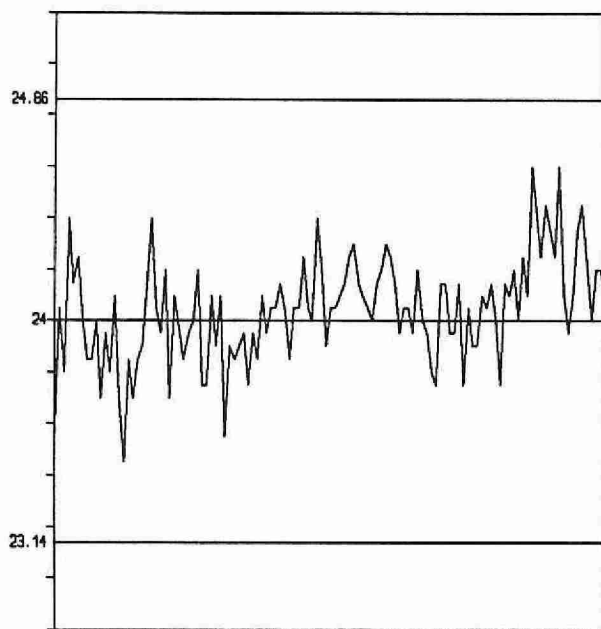
QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91



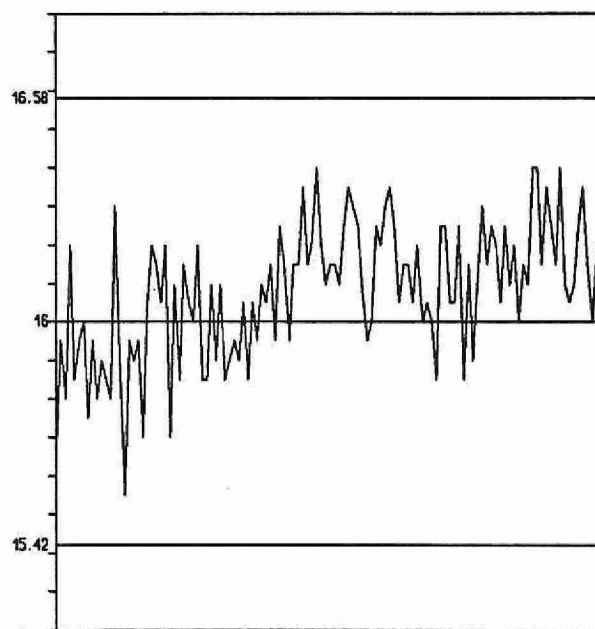
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/76
LIS Test Name Code	: NNOTUR	Units	: mg/L as N
Work Station Code	: WFNO3	Unit Code	: 064807
Method Code	: 002CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3220A		
Sample Type/Matrix	: Ministry of Health Water Samples		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.1

T value: 0.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	120	16.0	16.018	0.018	0.124
B :	120	8.0	8.023	0.023	0.075
A+B :	120	24.0	24.041	0.041	0.161
A-B :	120	8.0	7.994	-0.006	0.127
C :	120	8.0	8.023	0.023	0.075
D :	120	1.6	1.603	0.003	0.026
C+D :	120	9.6	9.627	0.027	0.084
C-D :	120	6.4	6.420	0.020	0.075

s.d.(AB) S(between runs): 0.10 Sw(within run): 0.09 S/Sw: 1.14

s.d.(CD) S(between runs): 0.056 Sw(within run): 0.053 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.0	-	25.0	for	A+B
7.3	-	8.7	for	A-B
9.15	-	10.05	for	C+D
5.95	-	6.85	for	C-D

DUPLICATES:

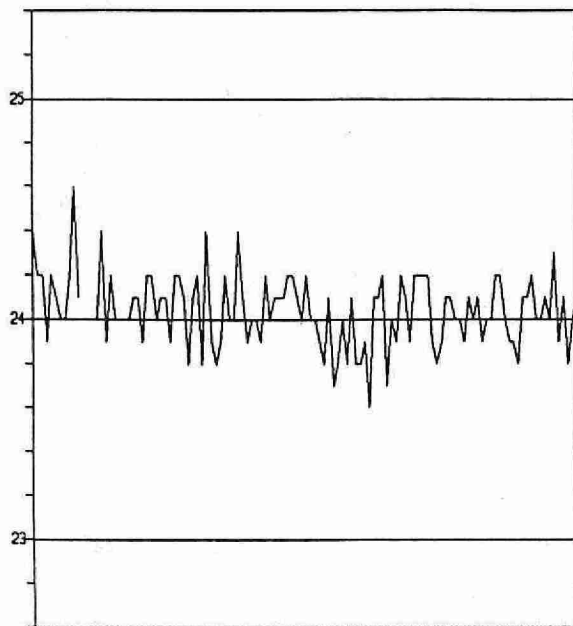
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
303	0.00 - 4.00	0.069	7.4
36	4.00 - 10.00	0.097	1.7
9	10.00 - 20.00	0.114	0.8
348	Overall	0.079	

OTHER CHECKS:

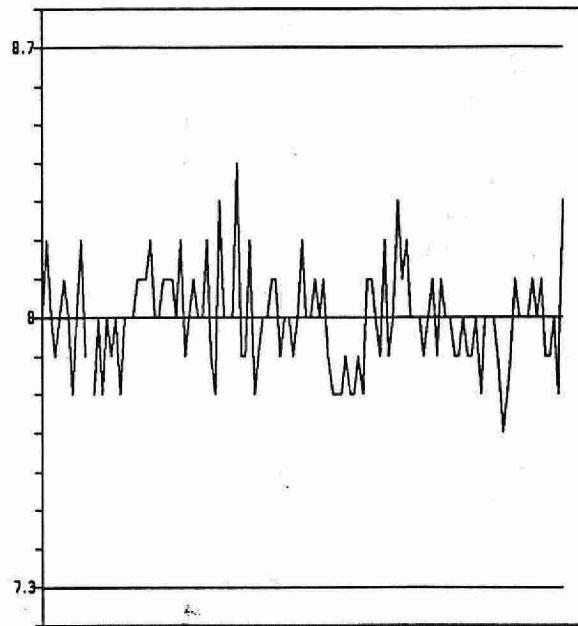
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	120	0.000	0.029

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

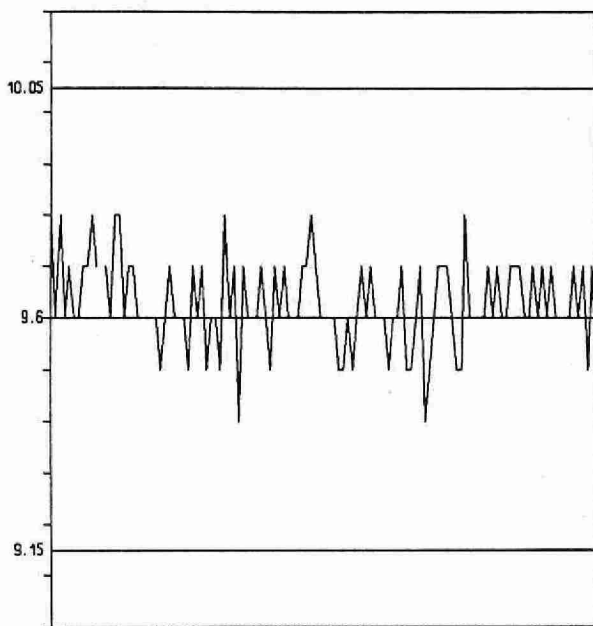
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



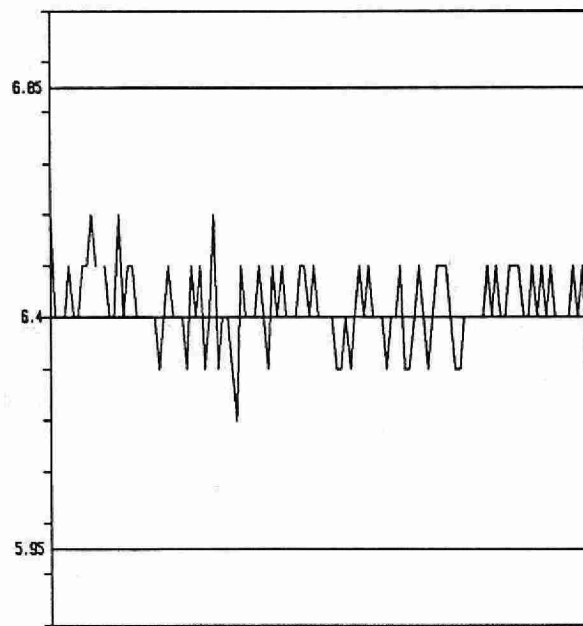
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** NITROGEN, NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3175A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.6 at the full scale level.

Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.001

T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRITE

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 0.200 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	105	0.16	0.161	0.001	0.0023
B :	105	0.08	0.080	0.000	0.0012
A+B :	105	0.24	0.240	0.000	0.0215
A-B :	105	0.08	0.081	0.001	0.0020
C :	105	0.08	0.080	0.000	0.0012
D :	105	0.016	0.0159	-0.0001	0.0007
C+D :	105	0.096	0.0963	0.0003	0.0014
C-D :	105	0.064	0.0645	0.0005	0.0013

s.d.(AB) S(between run): 0.0018 Sw(within runs): 0.0014 S/Sw: 1.30

s.d.(CD) S(between run): 0.0010 Sw(within runs): 0.0009 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231	-	0.249	for	A+B
0.074	-	0.086	for	A-B
0.092	-	0.100	for	C+D
0.061	-	0.067	for	C-D

DUPLICATES:

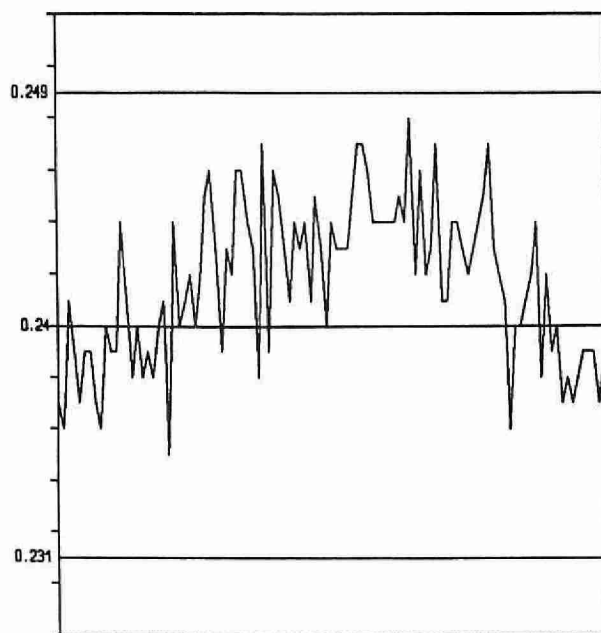
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
177	0.000 - 0.005	0.00070	45.7
76	0.005 - 0.020	0.00076	9.5
45	0.020 - 0.200	0.00147	4.1
298	Overall	0.00080	

OTHER CHECKS:

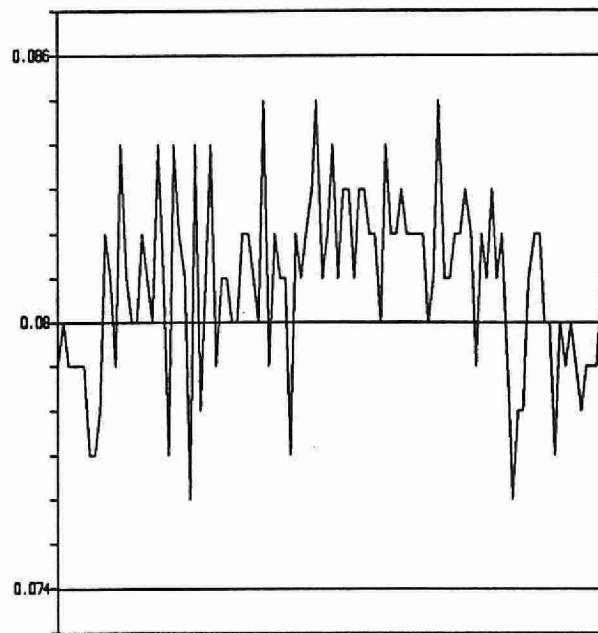
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	105	0.000057	0.000807

NITROGEN, NITRITE (mg/L AS N)

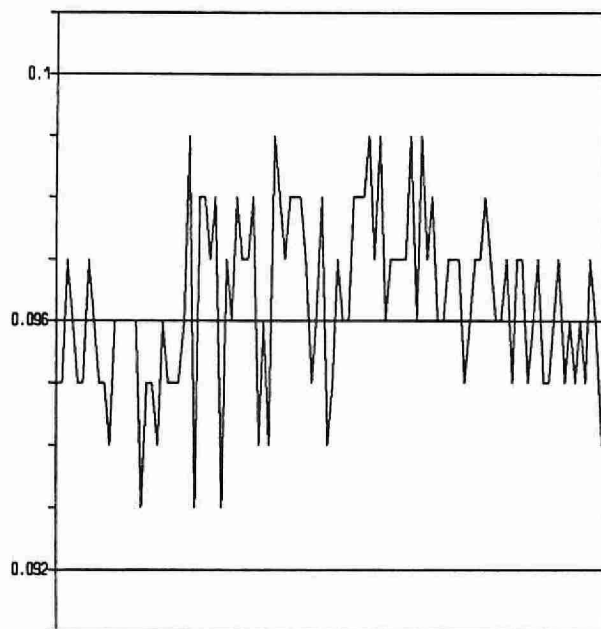
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



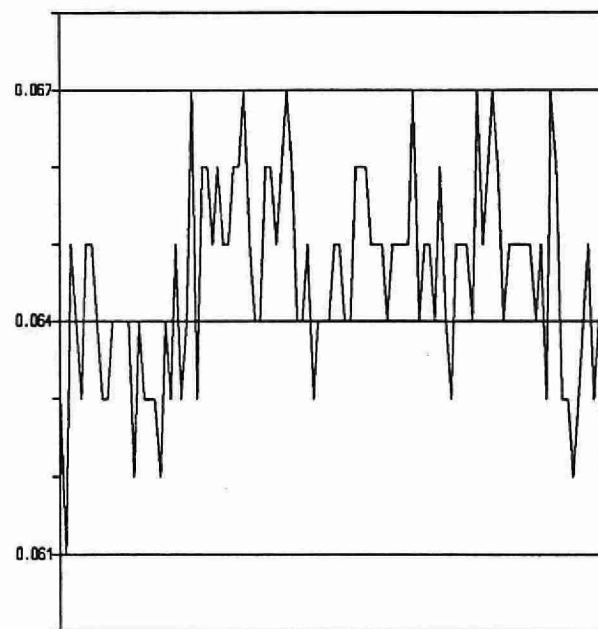
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** NITROGEN, NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3184A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.3 at the full scale level.

Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.005

T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRITE

QUALITY CONTROL DATA FROM 11/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	120	1.6	1.5999	-0.0001	0.0107
B :	120	0.8	0.7959	-0.0041	0.0079
A+B :	120	2.4	2.3958	-0.0042	0.0159
A-B :	120	0.8	0.8040	0.0040	0.0100
C :	120	0.8	0.7959	-0.0041	0.0079
D :	120	0.16	0.1592	-0.0008	0.0032
C+D :	120	0.96	0.9551	-0.0049	0.0097
C-D :	120	0.64	0.6367	-0.0033	0.0071

s.d.(AB) S(between runs): 0.0094 Sw(within run): 0.0071 S/Sw: 1.32

s.d.(CD) S(between runs): 0.0060 Sw(within run): 0.0050 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.61	-	0.67	for	C-D

DUPLICATES:

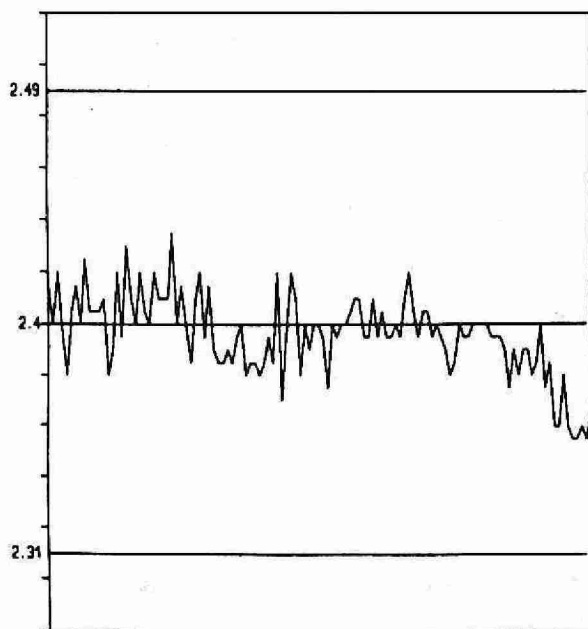
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
248	0.00	-	0.20	0.0045	64.1
36	0.20	-	1.00	0.0455	24.2
7	1.00	-	2.00	0.0851	7.2
291	Overall			0.0063	

OTHER CHECKS:

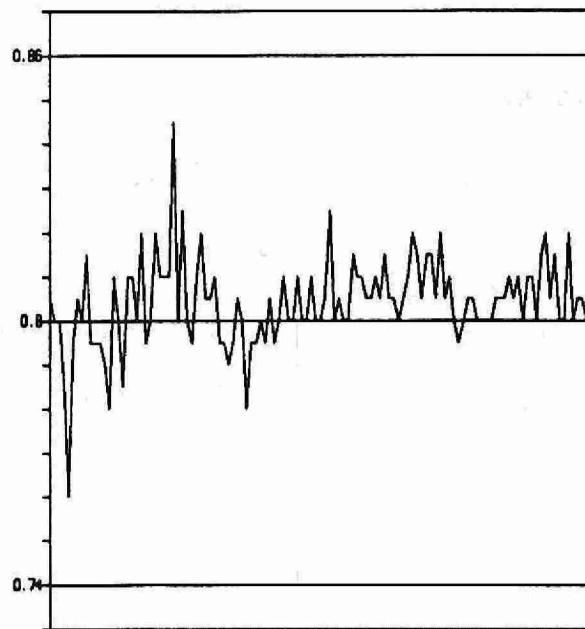
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	120	0.00108	0.00276

NITROGEN, NITRITE (mg/L as N)

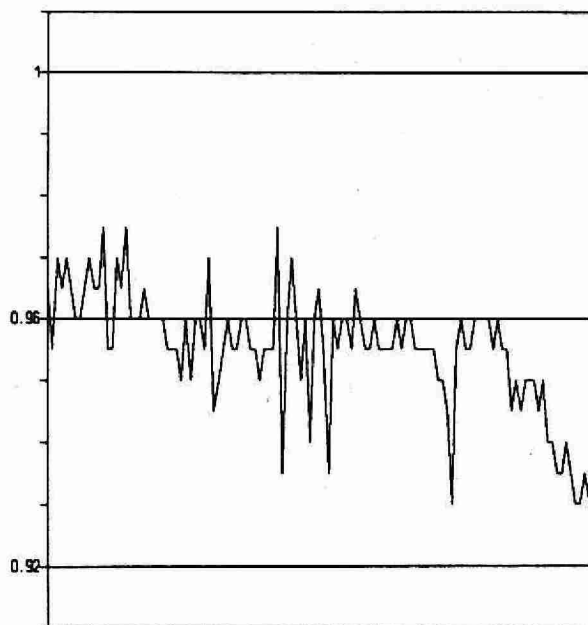
QUALITY CONTROL DATA FROM 11/01/91 TO 30/12/91



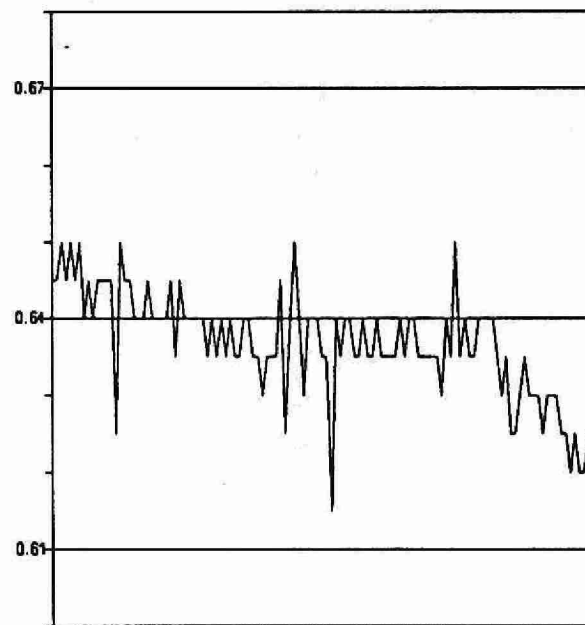
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** NITROGEN, TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: RTNP	Unit Code	: 064807
Method Code	: 004AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3180A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.3 at the full scale level.

Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters

Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay).

Coulourimetric measurement is through a 5.0 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration : LTBL plus 3 undigested standards, e.g. QCA

Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1

Drift : BL every 10 samples; undigested standard every 20 samples

NOTES:

Due to control limits that were exceeded on three occasions for C-D variate, samples were rerun.

NITROGEN, TOTAL KJELDAHL

QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	157	1.6	1.605	0.005	0.0174
B :	157	0.8	0.799	-0.001	0.0122
A+B :	157	2.4	2.404	0.004	0.0221
A-B :	157	0.8	0.806	0.006	0.0204
C :	157	0.8	0.799	-0.001	0.0122
D :	157	0.16	0.160	0.000	0.0092
C+D :	157	0.96	0.959	-0.001	0.0174
C-D :	157	0.64	0.639	-0.001	0.0129

s.d.(AB) S(between runs): 0.015 Sw(within run): 0.014 S/Sw: 1.04

s.d.(CD) S(between runs): 0.011 Sw(within run): 0.009 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	C+D
0.616	-	0.664	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	157	1.40	1.375	0.1727
R2 :	157	0.84	0.816	0.0825
R3 :	157	0.28	0.276	0.0340

DUPLICATES:

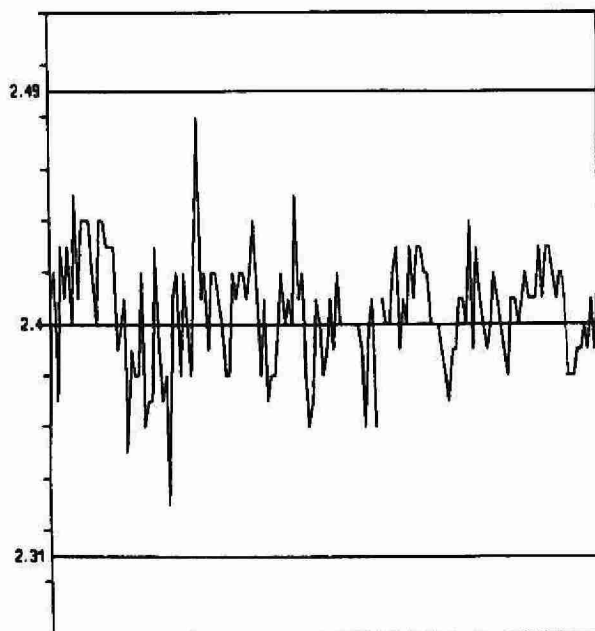
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
255	0.00 - 0.40	0.0275	22.7
126	0.40 - 1.00	0.0354	8.5
27	1.00 - 2.00	0.0333	2.4
408	Overall	0.0306	

OTHER CHECKS:

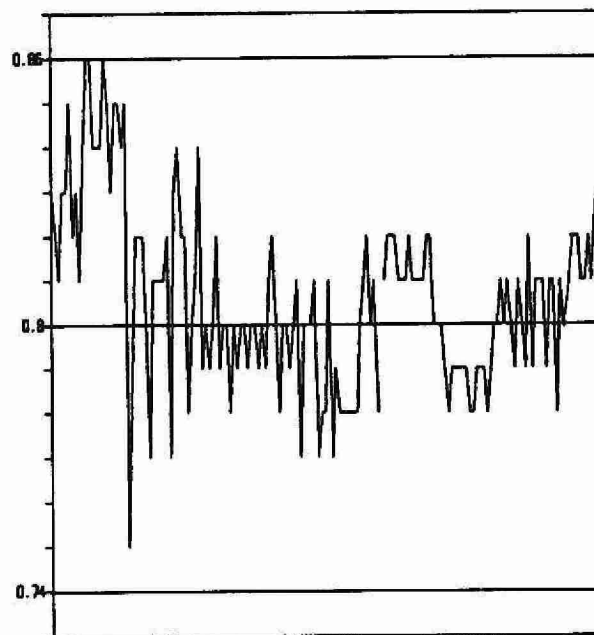
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	157	-0.002	0.0092
Digested Blank	157	0.011	0.0175

NITROGEN, TOTAL KJELDAHL (mg/L as N)

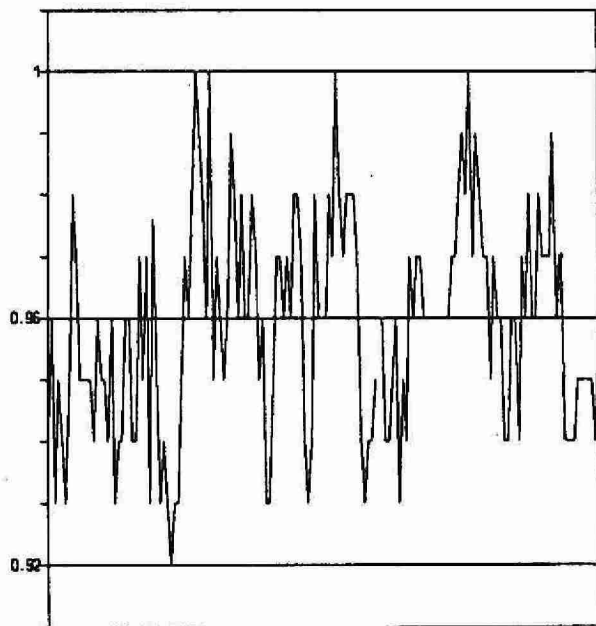
QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91



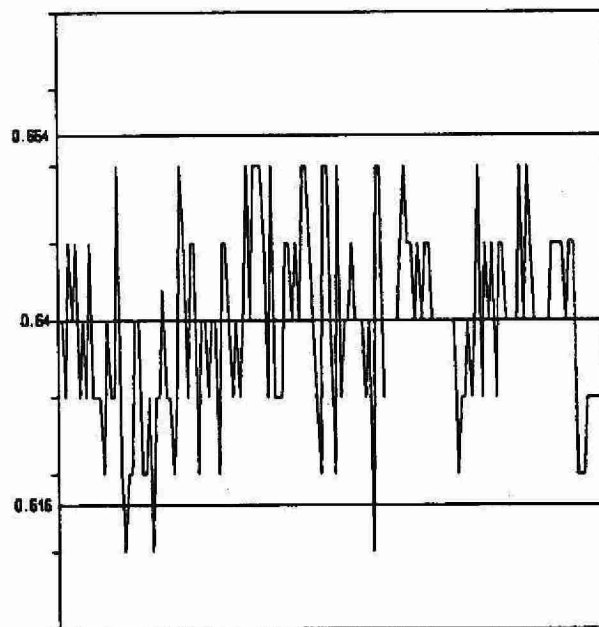
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** NITROGEN, TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: STKNP	Unit Code	: 064807
Method Code	: 004BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3199A		
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Effluents, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 1.1 at the full scale level.

Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters

Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay).

Coulourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration	: LTBL plus 3 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

NOTES:

**System is calibrated with undigested standards.

NITROGEN, TOTAL KJELDAHL

QUALITY CONTROL DATA FROM 11/01/91 TO 25/12/91

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	149	40.0	40.073	0.073	0.200
B :	149	20.0	20.045	0.045	0.142
A+B :	149	60.0	60.118	0.118	0.307
A-B :	149	20.0	20.028	0.028	0.162
C :	149	20.0	20.045	0.045	0.142
D :	149	4.0	3.995	-0.005	0.058
C+D :	149	24.0	24.040	0.040	0.184
C-D :	149	16.0	16.050	0.050	0.114

s.d.(AB) S(between runs): 0.17 Sw(within run): 0.11 S/Sw: 1.52

s.d.(CD) S(between runs): 0.11 Sw(within run): 0.08 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.1	-	24.9	for	C+D
15.4	-	16.6	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	149	35.0	34.41	1.424
R2 :	149	21.0	20.66	0.617
R3 :	149	7.0	6.82	0.231

DUPLICATES:

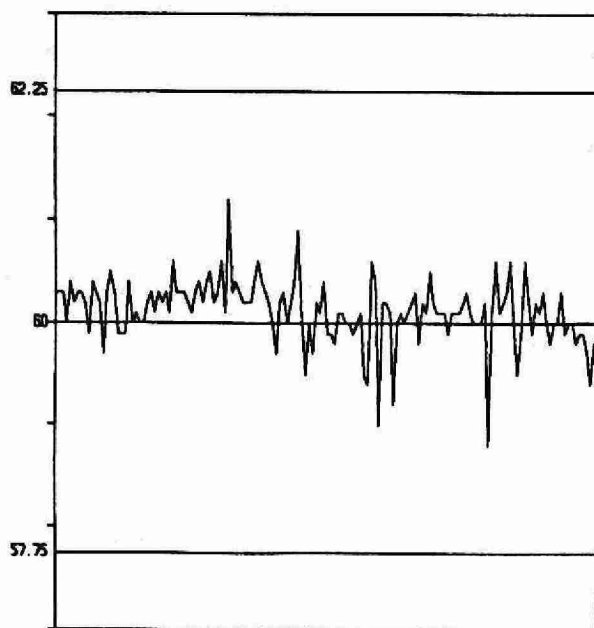
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
147	0.00 - 0.50	0.0441	56.7
140	0.50 - 2.00	0.0960	17.5
87	2.00 - 10.00	0.2343	19.8
66	10.00 - 50.00	0.6483	11.9
440	Overall	0.1294	

OTHER CHECKS:

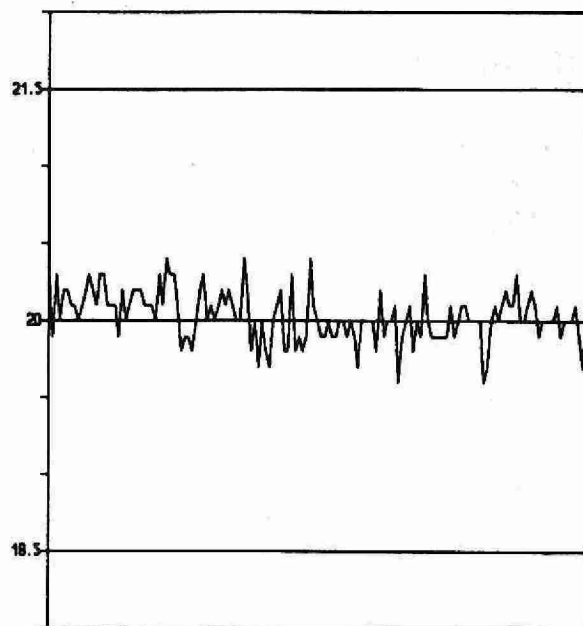
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	149	0.0191	0.040
Digested Blank	149	0.0255	0.058

NITROGEN, TOTAL KJELDAHL (mg/L as N)

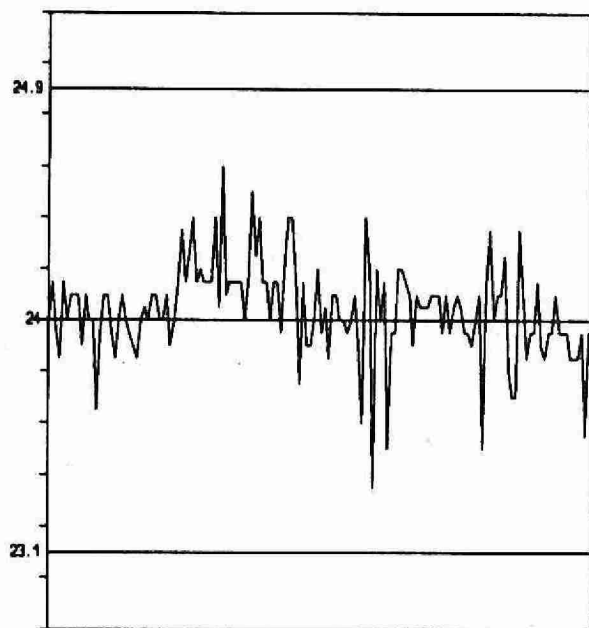
QUALITY CONTROL DATA FROM 11/01/91 TO 25/12/91



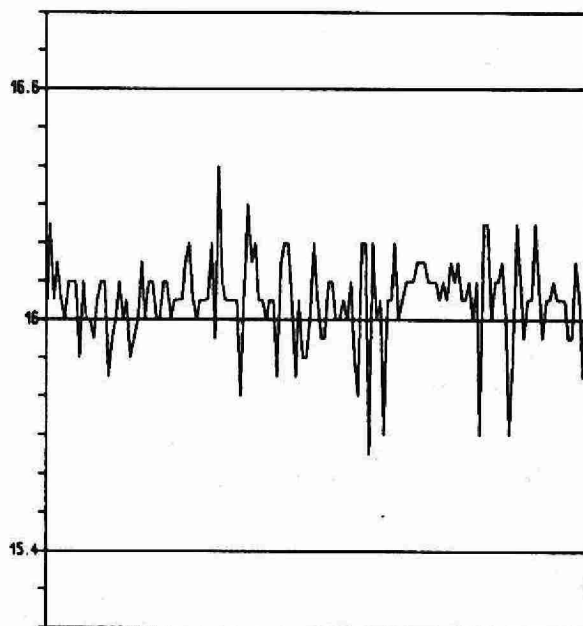
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** OXYGEN DEMAND, BIOCHEMICAL ***

IDENTIFICATION:

Laboratory	: BOD	Method Introduced	: Before '61
LIS Test Name Code	: BOD5	Units	: mg/L as O
Work Station Code	: SBBOD5	Unit Code	: 064808
Method Code	: 001A12	Supervisor	: F. Lo
Method Reference No.	: E3182A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required : 400 mL
Container : Glass or plastic

SAMPLE PREPARATION:

If necessary sample pH is adjusted to neutral and chlorine is removed by reaction with sodium sulphite.

ANALYTICAL PROCEDURE:

Oxygen depletion is measured as the difference in dissolved oxygen (DO) concentration. DO readings are taken prior to sample storage, and also at the end of storage in the dark at 20°C for five days (BOD5). If necessary, dilutions are made with aerated, nutrient-enriched water to obtain a 25-75% oxygen depletion. If the sample has undergone any of the sample preparation steps listed above or if the sample is an industrial waste, a sewage seed is added. For such samples, calculation of an appropriate seed correction is required.

INSTRUMENTATION:

- Weston and Stack Oxygen analyzer with DO probe equipped with stirrer and fitted with a Teflon membrane of 0.5 mil thickness which is permeable to oxygen.
- Titration equipment for Winkler analysis of dissolved oxygen.
- Incubator (19-21°C); BOD bottles (300 mL)

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION (DO):

Blank is a sulphite solution (negligible DO) and the standard is air-saturated distilled, deionized water. The DO content of the latter is read from a table after measuring its temperature and the barometric pressure in the laboratory.

CONTROLS:

Calibration (DO) : 2 QC solutions of distilled water which have been partially stripped of DO by flushing with nitrogen. These "solutions", of different but unknown DO, are analyzed with the Oxygen Analyzer and by the Winkler titration procedure. The difference between the values for the two analytical methods is utilized as a slope control for the DO Analyzer.

***** OXYGEN DEMAND, BIOCHEMICAL cont'd *****

CONTROLS cont'd

- Recovery (BOD5)* : 3 Recovery standards prepared from a combination of Glucose and Glutamic Acid e.g. R1; the expected BOD5 is 67% of the oxygen requirement for complete oxidation.
- Drift : Air saturated distilled water after every 24 samples.
- Blanks* : Distilled deionized water and BOD dilution water

NOTES:

Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.

* These solutions are incubated for five days alongside samples.

OXYGEN DEMAND, BIOCHEMICAL

QUALITY CONTROL DATA FROM 02/01/91 TO 24/12/91

Lab: BOD

Analytical Range: - to 400.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	87	0.00	-0.02	-0.02	0.10
B :	87	0.00	-0.02	-0.02	0.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

-0.25 - 0.25

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	45	2.20	2.37	0.80
R2 :	45	4.34	4.30	0.95
R3 :	45	6.52	6.34	0.98

DUPLICATES:

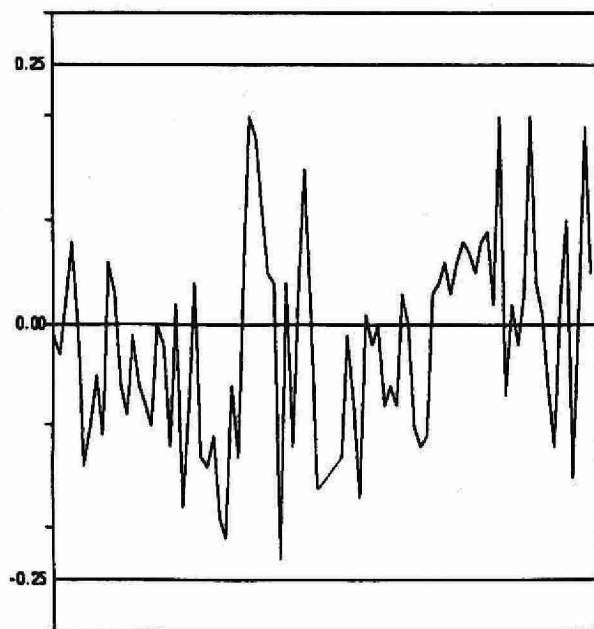
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
73	0	-	5	0.15	8.8
18	5	-	20	0.39	4.5
3	20	-	100	0.77	5.1
1	100	-	400	N.A.	N.A.
95	Overall			0.19	

OTHER CHECKS:

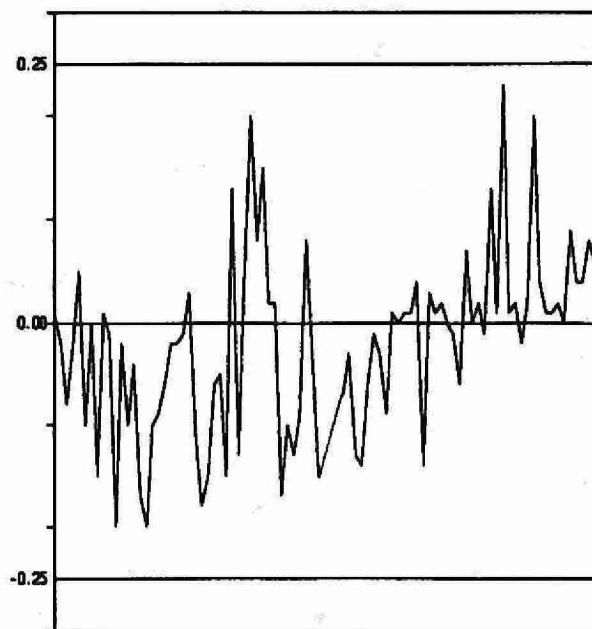
	Number of Data	Data Mean	Standard(1) Deviation
5 Day DOW Blank	45	0.32	0.47
5 Day BOD Blank	45	0.39	0.84

OXYGEN DEMAND, BIOCHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 02/01/91 TO 24/12/91



QUALITY CONTROL STANDARD A



QUALITY CONTROL STANDARD B

_____ CONTROL LIMIT

***** OXYGEN DEMAND, CHEMICAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: RCOD	Unit Code	: 064808
Method Code	: 5251C2	Supervisor	: M. Rawlings
Method Reference No.	: E3170A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 149°C. Analysis is completed by automated colourimetric measurement of trivalent chromium. Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

- Culture tubes with Teflon closures; mechanical-convection oven
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

3 digested BL plus 3 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (40 mg/L as O) spiked with 50 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week. The recovery standard is a material known to be very difficult to digest. The expected recovery is approximately 85%, based on long term experience. We continue to use this material in spite of the poor recovery, because if the slightest problem exists with the digestion step, the recovery falls off sharply to approximately 10%.

OXYGEN DEMAND, CHEMICAL

QUALITY CONTROL DATA FROM 09/01/91 TO 18/12/91

Lab: Colourimetry

Analytical Range: - to 40.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	47	40.0	39.953	-0.047	0.674
B :	47	10.0	9.826	-0.174	0.902
A+B :	47	50.0	49.779	-0.221	1.243
A-B :	47	30.0	30.107	0.107	0.985

s.d.(AB) S(between runs): 0.80 Sw(within run): 0.70 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

46.3 - 53.7 for A+B
27.2 - 32.8 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	47	39.0	33.87	2.79
R2 :	47	9.8	9.24	2.39

DUPLICATES:

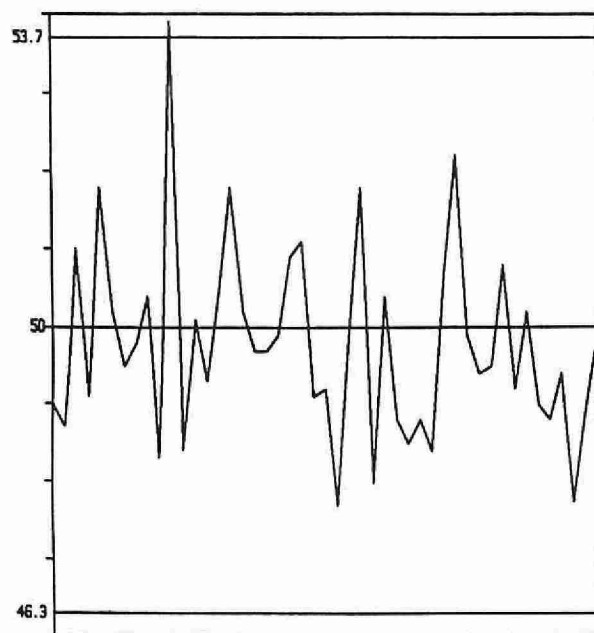
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
37	0.0	-	10.0	1.04	16.61
72	10.0	-	25.0	1.50	9.75
24	25.0	-	50.0	2.92	12.24
133	Overall			1.54	

OTHER CHECKS:

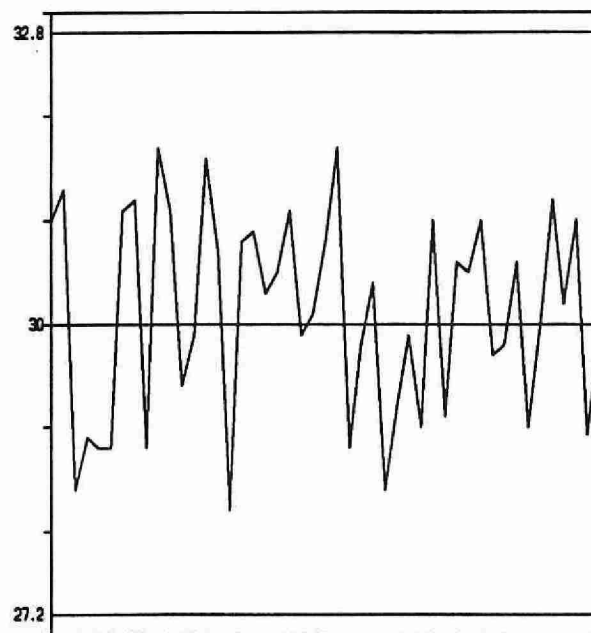
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	40	35.23	2.70

OXYGEN DEMAND, CHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 09/01/91 TO 18/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** OXYGEN DEMAND, CHEMICAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: SBCOD	Unit Code	: 064808
Method Code	: 002AC0	Supervisor	: M. Rawlings
Method Reference No.	: E3246A		
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 149°C. Analysis is completed by automated colourimetric measurement of trivalent chromium. Approximate absorbance: 0.6 at the full scale level.

INSTRUMENTATION:

-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

2 digested BL plus 4 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (50 mg/L as O) spiked to 900 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week. The recovery standard is a material known to be very difficult to digest. The expected recovery is approximately 85%, based on long term experience. We continue to use this material in spite of the poor recovery, because if the slightest problem exists with the digestion step, the recovery falls off sharply to approximately 10%.

OXYGEN DEMAND, CHEMICAL

QUALITY CONTROL DATA FROM 08/01/91 TO 20/12/91

Lab: Colourimetry

Analytical Range: - to 500.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	50	400	401.34	1.34	3.69
B :	50	100	100.01	0.01	6.31
A+B :	50	500	501.32	1.32	7.76
A-B :	50	300	301.33	1.33	6.78

s.d.(AB) S(between runs): 5.1 Sw(within run): 4.8 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

477.5 - 522.5 for A+B
285.0 - 315.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	50	390	360.2	41.0
R2 :	50	98	91.8	11.4

DUPLICATES:

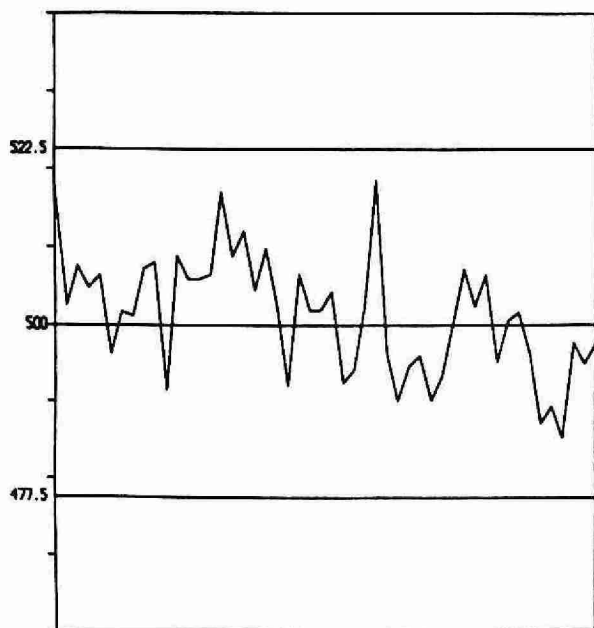
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
72	0 - 25	2.62	40.67
43	25 - 100	7.13	18.83
27	100 - 500	11.04	9.46
142	Overall	5.12	

OTHER CHECKS:

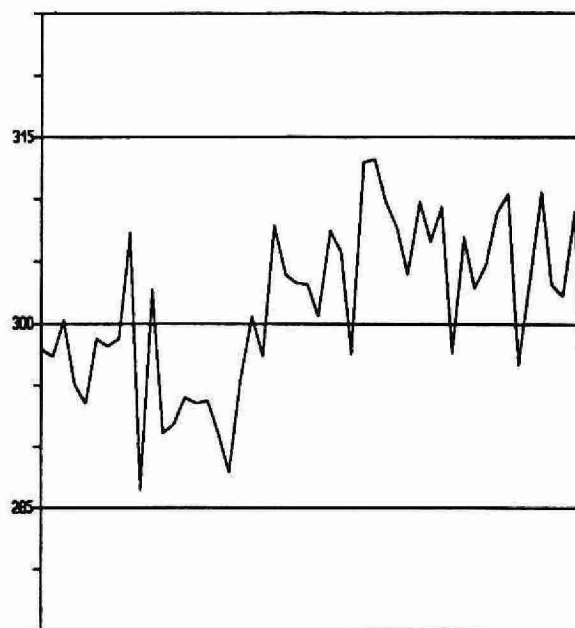
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	49	59.1	7.20

OXYGEN DEMAND, CHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 08/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: pH	Units	: dimensionless
Work Station Code	: DOCOP	Unit Code	: nil
Method Code	: 0903PH	Supervisor	: A. Neary
Method Reference No.	: E3027A		
Sample Type/Matrix	: Lakes		

SAMPLING:

Quantity Required : 100 mL
Container : BOD bottle filled to the brim; screw caps with cone-shaped liners.

ANALYTICAL PROCEDURE:

pH is measured directly on a stirred sample (50 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA, QCB
Drift : 2 standard buffers - 2 times daily

pH

QUALITY CONTROL DATA FROM 22/01/91 TO 19/12/91

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	65	6.86	6.855	-0.005	0.026
B :	65	4.00	4.041	0.041	0.030
A+B :	65	10.86	10.897	0.037	0.046
A-B :	65	2.86	2.814	-0.046	0.033

s.d.(AB) S(between runs): 0.028 Sw(within run): 0.023 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

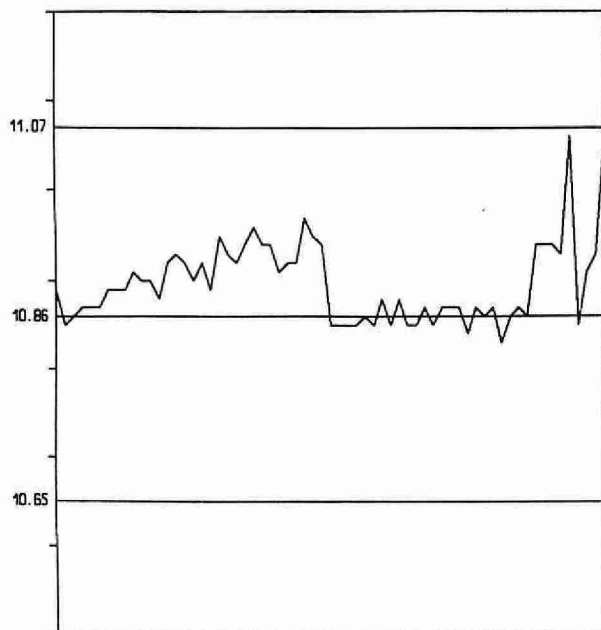
10.65 - 11.07 for A+B
2.72 - 3.00 for A-B

DUPLICATES:

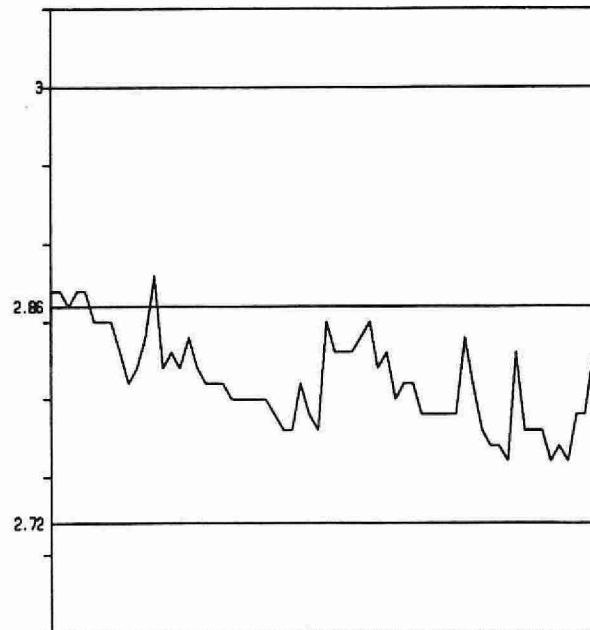
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
24	3.50 - 5.50	0.031	0.7
111	5.50 - 6.50	0.042	0.8
7	6.50 - 7.20	0.056	0.8
0	7.2 - 14.00	N.A.	N.A.
142	Overall	0.041	

pH

QUALITY CONTROL DATA FROM 22/01/91 TO 19/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** pH *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: pH	Units	: dimensionless
Work Station Code	: DOT	Unit Code	: nil
Method Code	: 0902PH	Supervisor	: A. Neary
Method Reference No.	: E3027A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Groundwater		

SAMPLING:

Quantity Required : 150 mL
Container : 250 mL Amber polyethylene or BOD bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

pH is measured directly on a stirred sample (100 mL) at room temperature. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards. Alkalinity (Gran) is performed simultaneously.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA, QCB
Drift : 2 standard buffers - 2 times daily

pH

QUALITY CONTROL DATA FROM 04/01/91 TO 31/12/91

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	229	6.86	6.863	0.003	0.014
B :	229	4.00	4.029	0.029	0.018
A+B :	229	10.86	10.892	0.032	0.025
A-B :	229	2.86	2.833	-0.027	0.020

s.d.(AB) S(between runs): 0.016 Sw(within run): 0.014 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

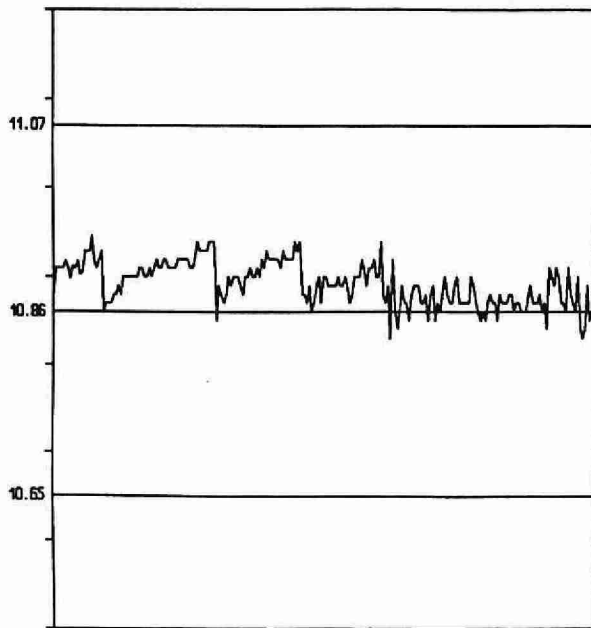
10.65 - 11.07 for A+B
2.72 - 3.00 for A-B

DUPLICATES:

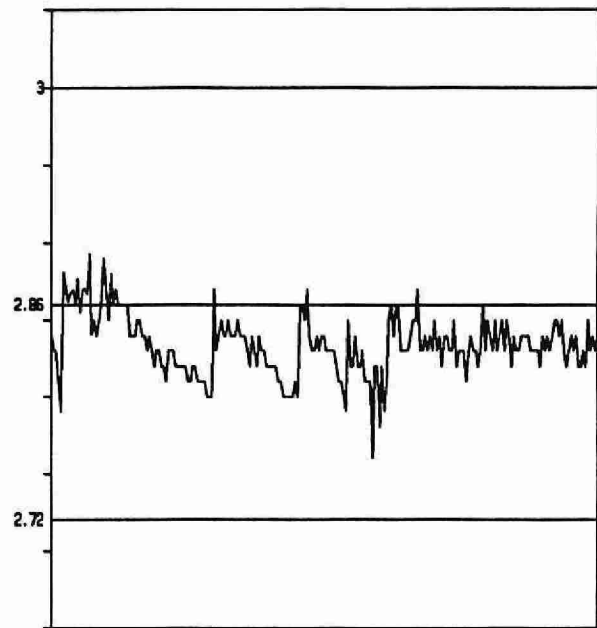
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
154	3.5 - 5.0	0.017	1.5
241	5.0 - 6.0	0.030	0.8
191	6.0 - 7.0	0.034	1.3
32	7.0 - 9.5	0.039	0.9
618	Overall	0.028	

pH

QUALITY CONTROL DATA FROM 04/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** pH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: PHACD	Unit Code	: nil
Method Code	: 002AI1	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Plastic or glass

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Total fixed endpoint acidity and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

pH

QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	49	4.45	4.468	0.018	0.0347
B :	49	3.75	3.736	-0.026	0.0315
A+B :	49	8.20	8.204	0.004	0.0621
A-B :	49	0.70	0.731	0.031	0.0233

s.d.(AB) S(between runs): 0.033 Sw(within run): 0.016 S/Sw:2.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

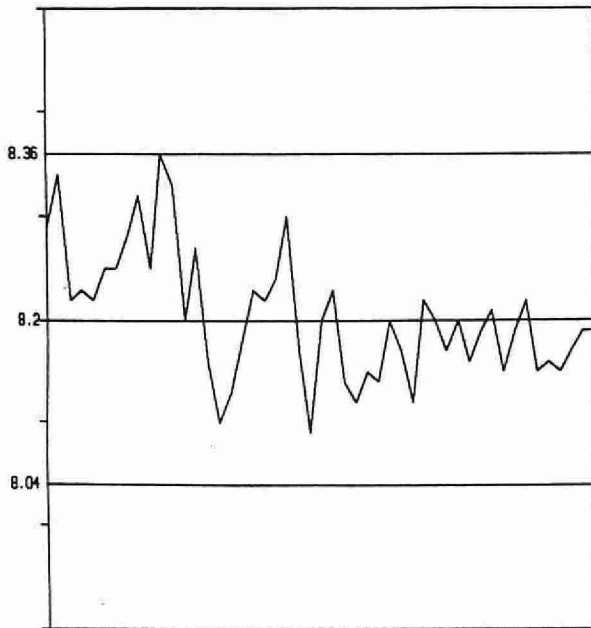
8.04 - 8.36 for A+B
0.59 - 0.81 for A-B

DUPLICATES:

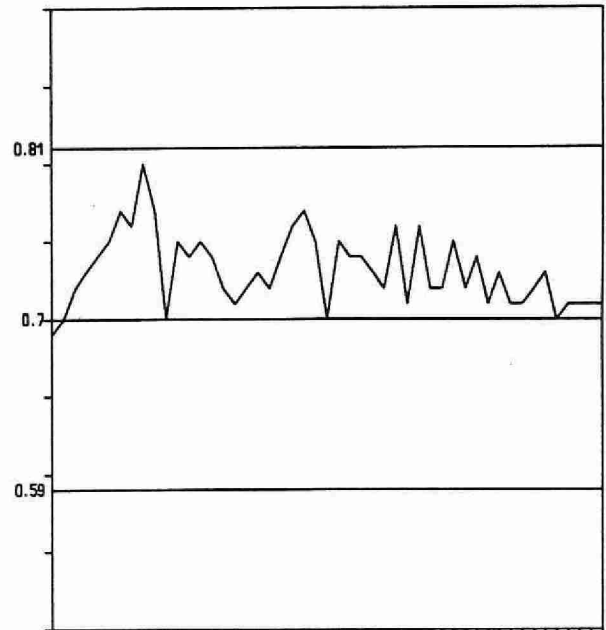
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	3.5 - 4.0	0.0118	0.3
91	4.0 - 5.0	0.0173	0.6
29	5.0 - 8.5	0.0615	0.94
0	8.5 - 14.0	N.A.	N.A.
128	Overall	0.0268	

pH

QUALITY CONTROL DATA FROM 09/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: RATS	Unit Code	: nil
Method Code	: 003AI2	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Gran Alkalinity, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration : 2 QC standards at pH 7.41 and pH 4.45 e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

pH

QUALITY CONTROL DATA FROM 03/01/91 TO 24/10/91

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	94	7.41	7.444	0.034	0.0254
B :	94	4.45	4.452	0.002	0.0365
A+B :	94	11.86	11.896	0.036	0.0459
A-B :	94	2.96	2.993	0.033	0.0431

s.d.(AB) S(between runs): 0.031 Sw(within run): 0.031 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

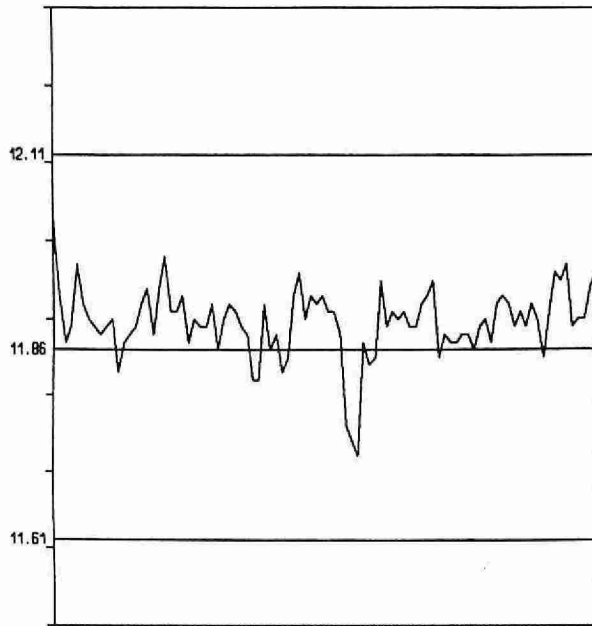
11.61 - 12.11 for A+B
2.79 - 3.13 for A-B

DUPLICATES:

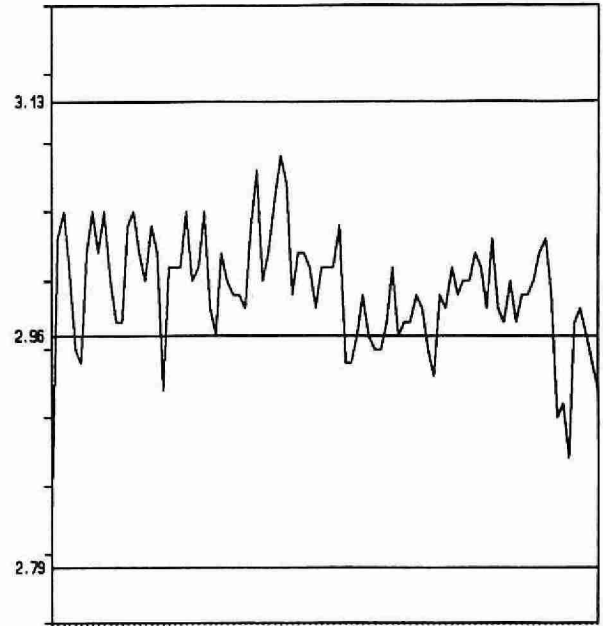
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
22	3.50 - 7.00	0.0555	0.92
97	7.00 - 8.00	0.0868	1.12
139	8.00 - 9.50	0.0688	0.83
258	Overall	0.0743	

pH

QUALITY CONTROL DATA FROM 03/01/91 TO 24/10/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WATS	Unit Code	: nil
Method Code	: 003A12	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Total fixed endpoint alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration	: 2 standards e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

pH

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	136	7.41	7.45	0.04	0.0213
B :	136	4.45	4.452	0.002	0.0352
A+B :	136	11.86	11.90	0.04	0.0407
A-B :	136	2.96	3.00	0.04	0.0417

s.d.(AB) S(between runs): 0.029 Sw(within run): 0.029 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

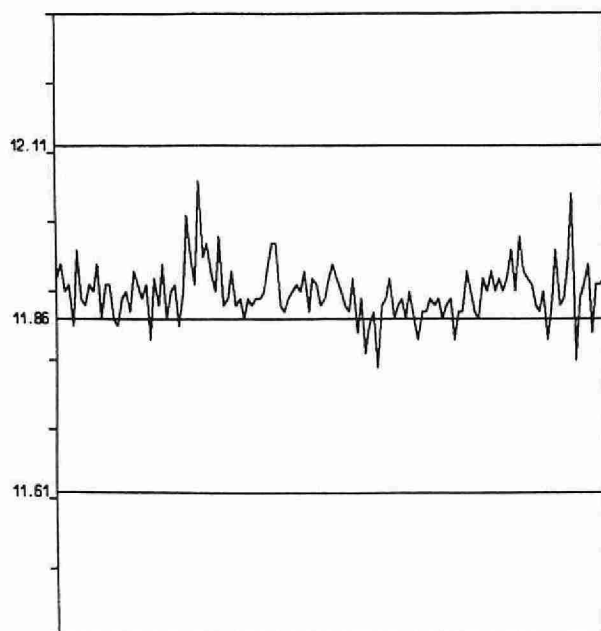
11.61 - 12.11 for A+B
2.79 - 3.13 for A-B

DUPLICATES:

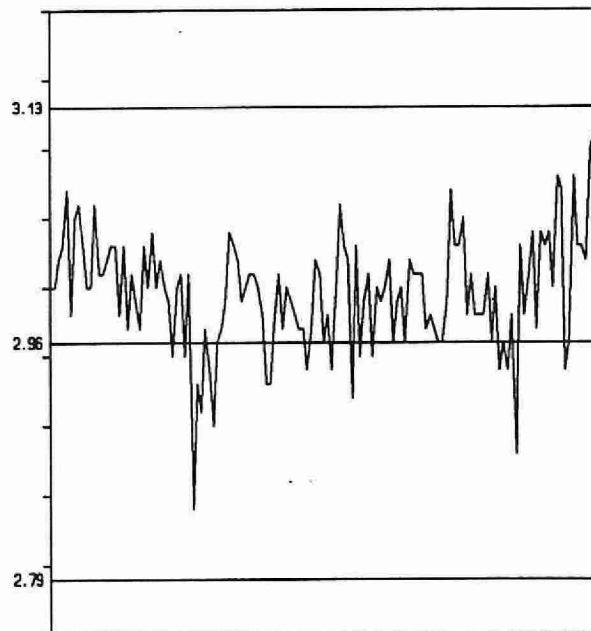
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
11	6.00 - 7.00	0.1374	1.8
190	7.00 - 8.00	0.1141	1.4
170	8.00 - 9.00	0.0764	1.1
7	9.00 - 11.00	0.1858	1.7
378	Overall	0.1003	

pH

QUALITY CONTROL DATA FROM 03/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** pH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '70
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WQSDIRT	Unit Code	: Nil
Method Code	: 004AI4	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (15 mL) at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, Radiometer combination electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : 2 standards e.g. QCA

pH

QUALITY CONTROL DATA FROM 07/01/91 TO 23/12/91

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	30	7.41	7.421	0.011	0.0259
B :	30	4.45	4.441	-0.009	0.0383
A+B :	30	11.86	11.862	0.002	0.0497
A-B :	30	2.96	2.979	0.019	0.0426

s.d.(AB) S(between runs): 0.033 Sw(within run): 0.030 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

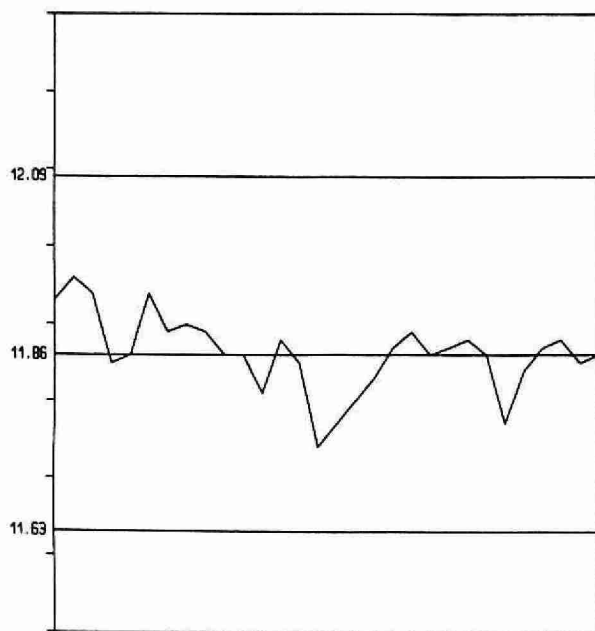
11.63 - 12.09 for A+B
2.81 - 3.11 for A-B

DUPLICATES:

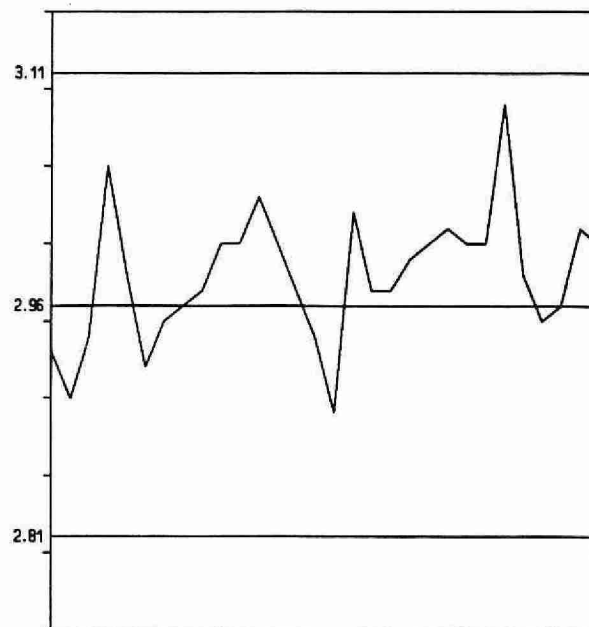
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
11	5.0 - 7.00	0.0692	1.0
46	7.00 - 8.00	0.0291	0.4
30	8.00 - 9.00	0.0402	1.6
87	Overall	0.0381	

pH

QUALITY CONTROL DATA FROM 07/01/91 TO 23/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHECA	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 324AB1	Supervisor	: A. Neary
Method Reference No.	: E3039A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL 0.01 M calcium chloride are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. pH is measured on the supernatant.

INSTRUMENTATION:

- Corning pH/ion meter 150
- Corning Combination X-EL electrode
- Balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 2

CALIBRATION:

2 standard buffers covering the pH range of 4 to 8

CONTROLS:

Calibration : 3 buffers
Recovery : 3 long term soil samples plus a round robin ECSS sample (latter run occasionally).

pH

QUALITY CONTROL DATA FROM 31/01/91 TO 05/02/91

Lab: Dorset Soils

Analytical Range: - to 10 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	7.0	7.000	0.000	0.006
B :	3	4.0	3.998	-0.002	0.006
A+B :	3	11.0	10.998	-0.002	0.012
A-B :	3	3.0	3.002	0.002	0.001
C :	3	6.8	6.731	-0.069	0.009
D :	3	4.0	3.998	-0.002	0.006
C+D :	3	10.8	10.729	-0.071	0.010
C-D :	3	2.8	2.733	-0.067	0.012

s.d.(AB) S(between runs): 0.006 Sw(within run): 0.0007 S/Sw: 8.72

s.d.(CD) S(between runs): 0.008 Sw(within run): 0.009 S/Sw: 0.93

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.9	-	11.1	for	A+B
2.9	-	3.1	for	A-B
10.7	-	10.9	for	C+D
2.7	-	2.9	for	C-D

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	7.6	0.092
R2 :	3	4.9	0.058
R3 :	3	4.8	0.021

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	3.0 - 4.0	N.A.	N.A.
9	4.0 - 5.0	0.034	0.7
0	5.0 - 8.0	N.A.	N.A.
9	Overall	0.034	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Slope	3	58.49	0.006

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHEW	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 304AB1	Supervisor	: A. Neary
Method Reference No.	: E3038A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL of deionized water are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. pH is measured on the supernatant.

INSTRUMENTATION:

- Corning pH/ion meter 150
- Corning Combination X-EL electrode
- Balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 8

CONTROLS:

Calibration : 3 buffers
Recovery : 3 long term soil samples plus a round robin ECSS sample (run occasionally).

pH

QUALITY CONTROL DATA FROM 31/01/91 TO 05/02/91

Lab: Dorset Soils

Analytical Range: - to 10 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	7.0	7.000	0.000	0.006
B :	3	4.0	3.998	-0.002	0.006
A+B :	3	11.0	10.998	-0.002	0.012
A-B :	3	3.0	3.002	0.002	0.001
C :	3	6.8	6.731	-0.069	0.009
D :	3	4.0	3.998	-0.002	0.006
C+D :	3	10.8	10.729	-0.071	0.010
C-D :	3	2.8	2.733	-0.067	0.012

s.d.(AB) S(between runs): 0.006 Sw(within run): 0.0007 S/Sw: 8.72

s.d.(CD) S(between runs): 0.008 Sw(within run): 0.009 S/Sw: 0.93

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.9	-	11.1	for	A+B
2.9	-	3.1	for	A-B
10.7	-	10.9	for	C+D
2.7	-	2.9	for	C-D

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	8.56	0.095
R2 :	3	5.77	0.083
R3 :	3	5.40	0.020

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
0	3.0	-	4.0	N.A.	N.A.
3	4.0	-	5.0	0.081	1.7
6	5.0	-	8.0	0.045	0.8
9	Overall			0.051	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Slope	3	58.48	0.180

***** PHENOLICS, REACTIVE *****

IDENTIFICATION:

Laboratory	: MISA	Method Introduced	: 01/03/89
LIS Test Name Code	: PHNOL	Units	: ug/L as Phenol
Work Station Code	: MPHEN	Unit Code	: 063704
Method Code	: 002BC3	Supervisor	: J. McBride
Method Reference No.	: E3290A		
Sample Type/Matrix	: Sewage, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass

ANALYTICAL PROCEDURE:

Samples are screened for oxidizing and reducing potential and neutralized, if required, and pH adjusted to 4 +/- 0.3 before manual distillation. Reactive phenolics are determined on the distillate colourimetrically, by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide. Approximate absorbance: 0.022 at full scale

INSTRUMENTATION:

Basic automated modular continuous flow system. Colourimetric measurement is through a 5.0 cm light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

Blank plus 4 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BI, standard, BI every 10 samples
Recovery	: Spiked blank and spiked sample every 10 samples
Blank	: Manual distillation blank checked before using every apparatus
Matrix	: Distillate from every sample is analyzed at 50% further dilution

NOTES:

The MPHEN work station was set up specifically for the difficult and variable matrices in MISA effluents.

MODIFICATIONS:

Minor modifications have been made to the procedure since starting in 1989: e.g. glassware washing and proofing improved, rinse waterline changed from plastic to glass where possible, concentration of calibration solutions was modified to cover analytical range better, and the in-line heater was removed.

PHENOLICS, REACTIVE

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91

Lab: Colourimetry

Analytical Range: - to 40.0 ug/L as Phenol

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	40	40.09	0.09	0.4340
B :	45	10	9.99	-0.01	0.2838
A+B :	45	50	50.08	0.08	0.5606
A-B :	45	30	30.10	0.10	0.4729

s.d.(AB) S(between runs): 0.37 Sw(within run): 0.33 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

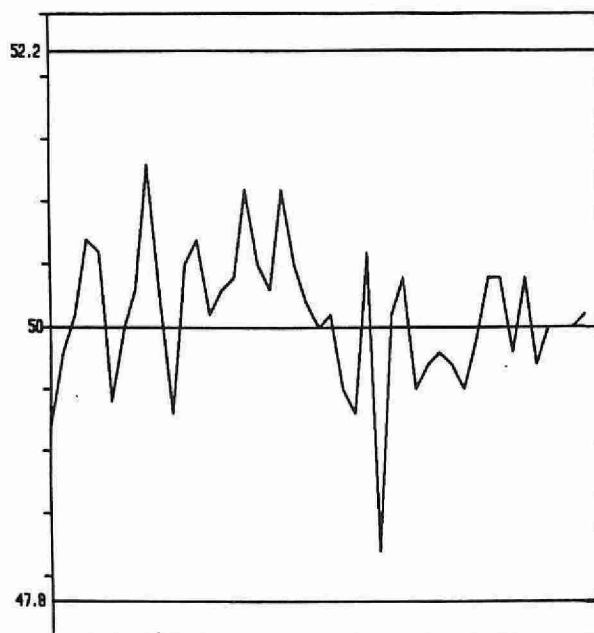
47.8 - 52.2 for A+B
28.5 - 31.5 for A-B

DUPLICATES:

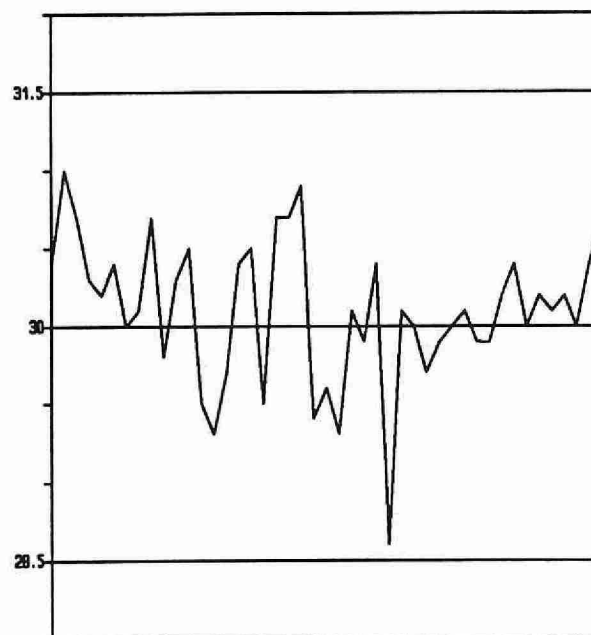
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
28	0.0	-	2.5	0.1367	9.8
15	2.5	-	20.0	0.2956	4.1
2	20.0	-	40.0	0.5000	1.5
45	Overall			0.1936	

PHENOLICS, REACTIVE (ug/L as Phenol)

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** PHENOLICS, REACTIVE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: PHNOL	Units	: ug/L as Phenol
Work Station Code	: ROPHEN	Unit Code	: 063704
Method Code	: 002BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3179A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass
Preservative	: Sulfuric acid to pH 1.5 - 2
Other	: Special bottle (with white cap) containing preservative is available

ANALYTICAL PROCEDURE:

Samples are automatically distilled from an acid media, and reactive phenolics in the distillate are determined colourimetrically by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide.

Approximate absorbance: 0.03 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.2

T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, standard, BL every 10 samples

NOTES:

A report identifying reactive phenolics is available on request.

PHENOLICS, REACTIVE

QUALITY CONTROL DATA FROM 02/01/91 TO 24/12/91

Lab: Colourimetry

Analytical Range: - to 50.0 ug/L as Phenol

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	85	40	39.92	-0.08	0.505
B :	85	10	9.93	-0.07	0.339
A+B :	85	50	49.85	-0.15	0.668
A-B :	85	30	29.99	-0.01	0.542

s.d.(AB) S(between runs): 0.43 Sw(within run): 0.38 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

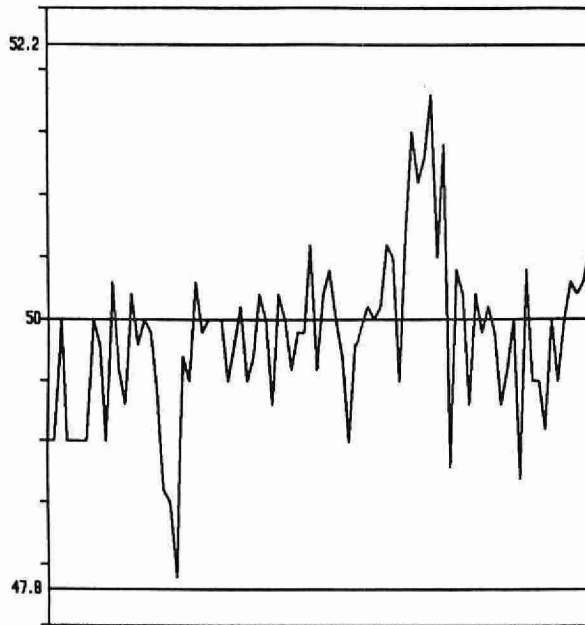
47.8	-	52.2	for A+B
28.5	-	31.5	for A-B

DUPLICATES:

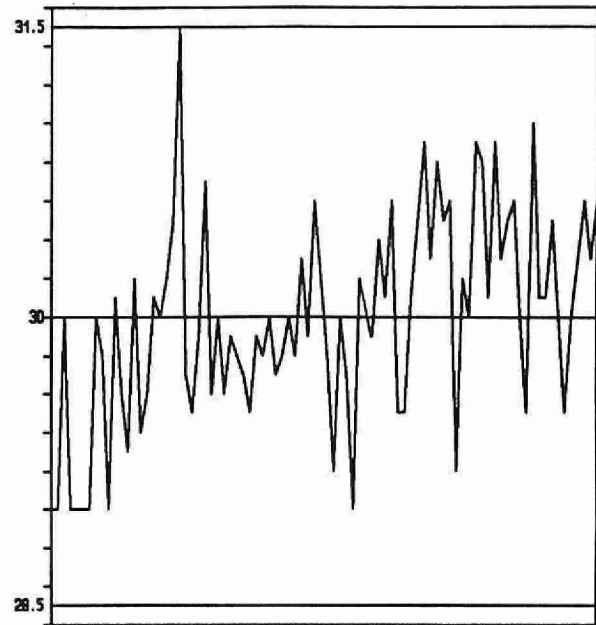
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
106	0.0	-	0.20	0.126	54.7
117	0.20	-	2.00	0.147	33.1
17	2.00	-	10.00	0.292	14.3
6	10.00	-	50.00	0.615	2.9
246	Overall			0.232	

PHENOLICS, REACTIVE (ug/L as Phenol)

QUALITY CONTROL DATA FROM 02/01/91 TO 24/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** PHOSPHORUS, REACTIVE ortho-PHOSPHATE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: RNDNP	Unit Code	: 064815
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3266A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ortho-phosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.2 at the full scale level.

Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.0005

T value: 0.0025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

PHOSPHORUS, REACTIVE ortho-PHOSPHATE

QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 0.10 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	104	0.08	0.0796	-0.0004	0.0009
B :	104	0.04	0.04003	0.00003	0.0008
A+B :	104	0.12	0.1196	-0.0004	0.0014
A-B :	104	0.04	0.0395	-0.0005	0.0010
C :	104	0.04	0.04003	0.00003	0.0006
D :	104	0.008	0.0079	-0.0001	0.0006
C+D :	104	0.048	0.0480	0.0000	0.0012
C-D :	104	0.032	0.0321	0.0001	0.0008

s.d.(AB) S(between runs): 0.0009 Sw(within run): 0.0007 S/Sw: 1.22

s.d.(CD) S(between runs): 0.0007 Sw(within run): 0.0006 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.115	-	0.125	for	A+B
0.037	-	0.043	for	A-B
0.045	-	0.051	for	C+D
0.030	-	0.034	for	C-D

DUPLICATES:

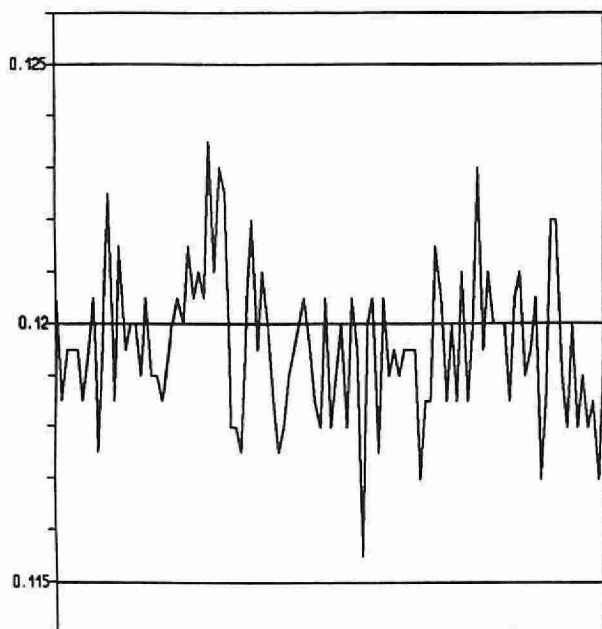
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
249	0.00	-	0.02	0.0009	29.6
19	0.02	-	0.05	0.0021	5.8
11	0.05	-	0.10	0.0022	2.8
279	Overall			0.0011	

OTHER CHECKS:

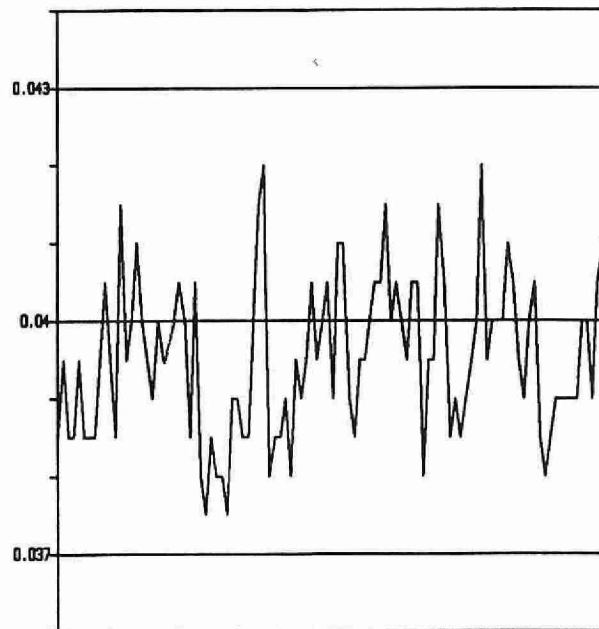
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	105	-0.00013	0.00040

PHOSPHORUS, REACTIVE ortho-PHOSPHATE (mg/L as P)

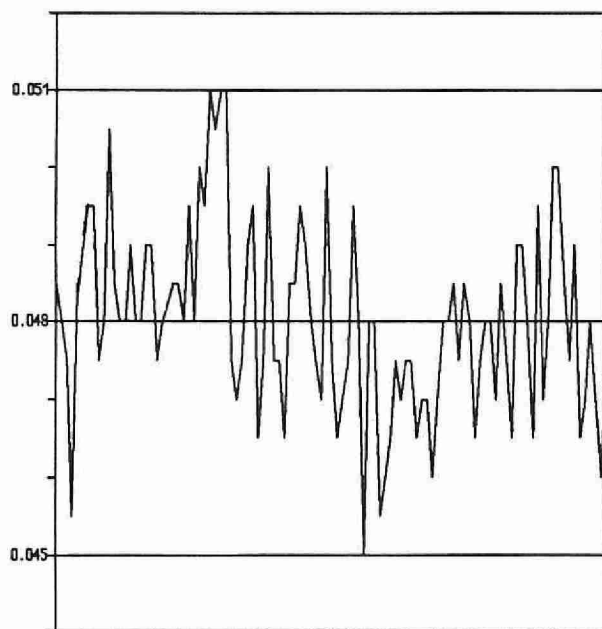
QUALITY CONTROL DATA FROM 03/01/91 TO 30/12/91



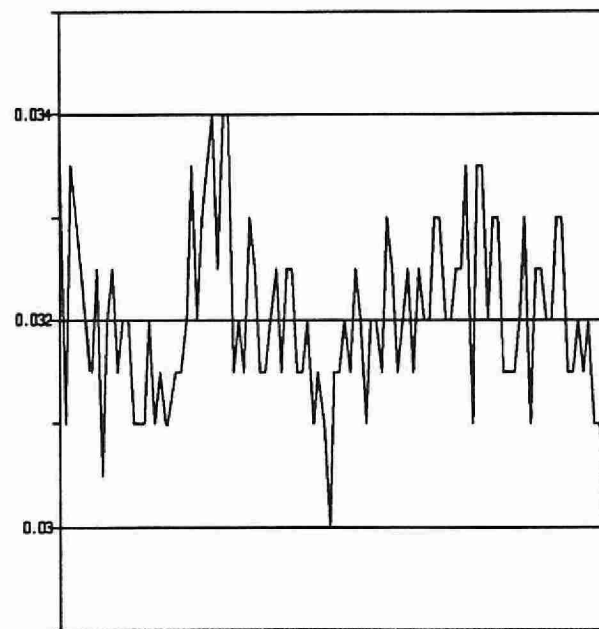
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

CONTROL LIMIT

***** PHOSPHORUS, REACTIVE ortho-PHOSPHATE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: SDNP	Unit Code	: 064815
Method Code	: 103BC2	Supervisor	: M. Rawlings
Method Reference No:	: E3185A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ortho-phosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.5 at the full scale level.

Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

PHOSPHORUS, REACTIVE ortho-PHOSPHATE

QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	120	8.0	8.003	0.003	0.041
B :	120	4.0	4.001	0.001	0.025
A+B :	120	12.0	12.004	0.004	0.050
A-B :	120	4.0	4.002	0.002	0.046
C :	120	4.0	4.001	0.001	0.025
D :	120	0.8	0.803	0.003	0.014
C+D :	120	4.8	4.804	0.004	0.028
C-D :	120	3.2	3.198	-0.002	0.028

s.d.(AB) S(between runs): 0.034 Sw(within run): 0.033 S/Sw: 1.05

s.d.(CD) S(between runs): 0.020 Sw(within run): 0.020 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.55	-	12.45	for	A+B
3.70	-	4.30	for	A-B
4.62	-	4.98	for	C+D
3.08	-	3.32	for	C-D

DUPLICATES:

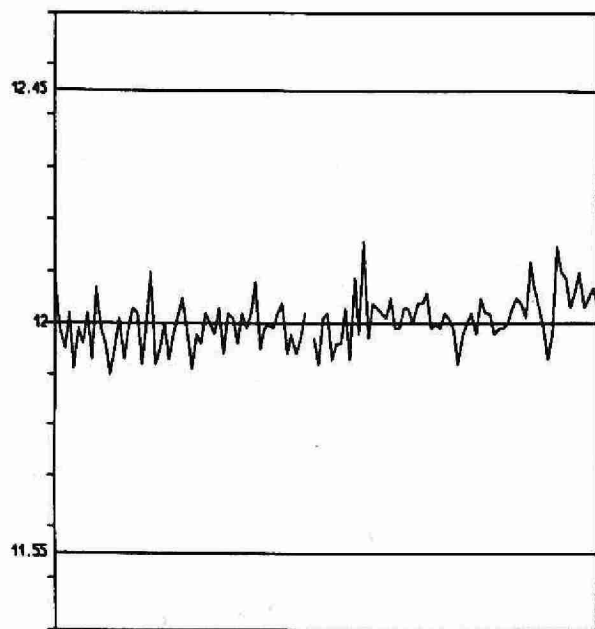
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
132	0.00	-	0.04	0.0140	121.2
32	0.04	-	0.10	0.0320	49.1
33	0.10	-	0.20	0.0420	33.8
55	0.20	-	1.00	0.0559	21.2
44	1.00	-	10.00	0.1480	9.1
296	Overall			0.0346	

OTHER CHECKS:

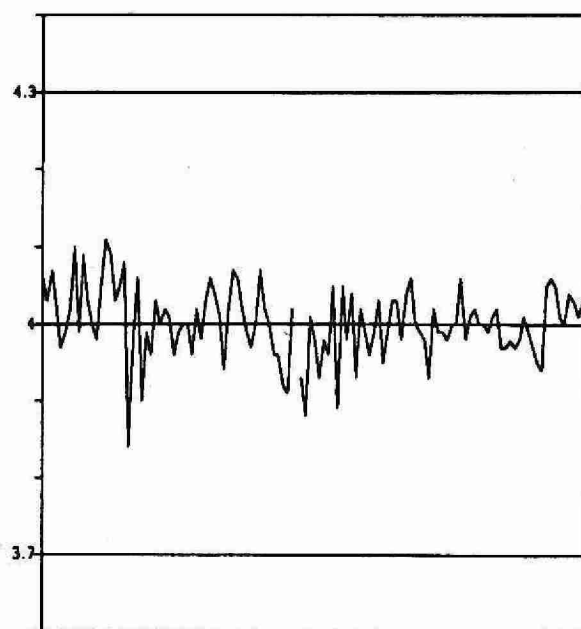
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	121	-0.0007	0.003

PHOSPHORUS, REACTIVE ortho-PHOSPHATE (mg/L as P)

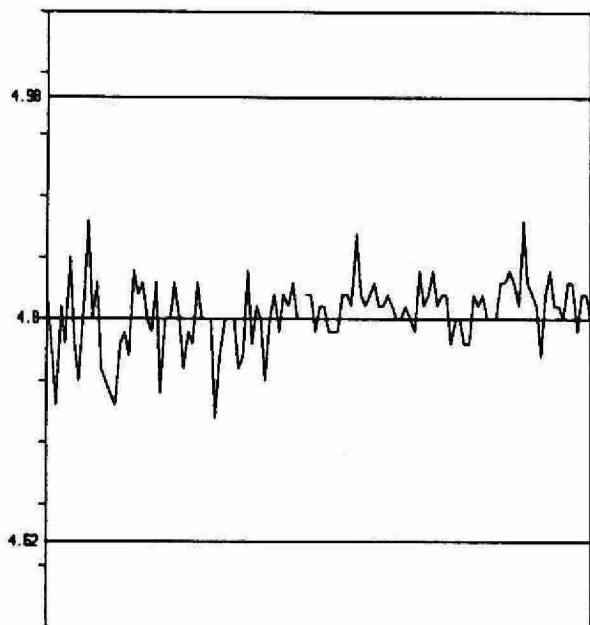
QUALITY CONTROL DATA FROM 04/01/91 TO 30/12/91



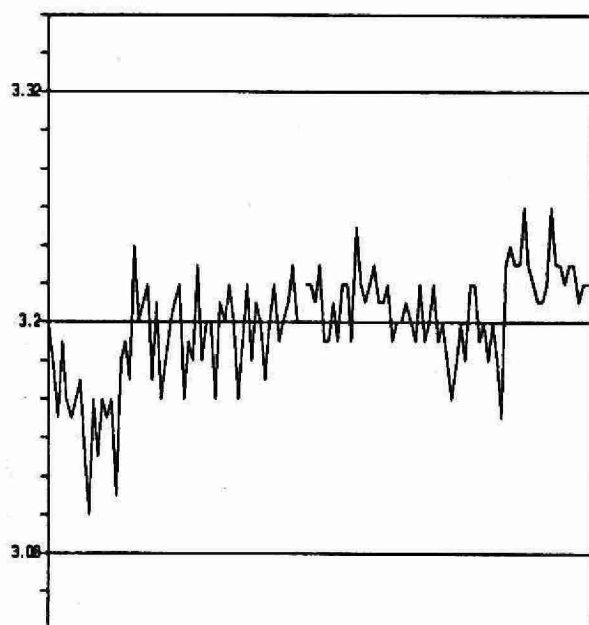
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** PHOSPHORUS, TOTAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: RTNP	Unit Code	: 064815
Method Code	: 504AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3181A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.4 at the full scale level.

Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

Three Block digesters

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.

Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.002

T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91

Lab: Colourimetry

Analytical Range: - to 0.20 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	155	0.16	0.1601	0.0001	0.0012
B :	155	0.08	0.0794	-0.0006	0.0008
A+B :	155	0.24	0.2396	-0.0004	0.0016
A-B :	155	0.08	0.0807	0.0007	0.0011
C :	155	0.08	0.0794	-0.0006	0.0008
D :	155	0.016	0.0156	-0.0004	0.0007
C+D :	155	0.096	0.0951	-0.0009	0.0011
C-D :	155	0.064	0.0638	-0.0002	0.0087

s.d.(AB) S(between runs): 0.0010 Sw(within run): 0.0008 S/Sw: 1.27

s.d.(CD) S(between runs): 0.0007 Sw(within run): 0.0006 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231	-	0.249	for	A+B
0.074	-	0.086	for	A-B
0.092	-	0.100	for	C+D
0.0616	-	0.0664	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	156	0.14	0.137	0.0076
R2 :	157	0.084	0.083	0.0111
R3 :	157	0.028	0.028	0.0048

DUPLICATES:

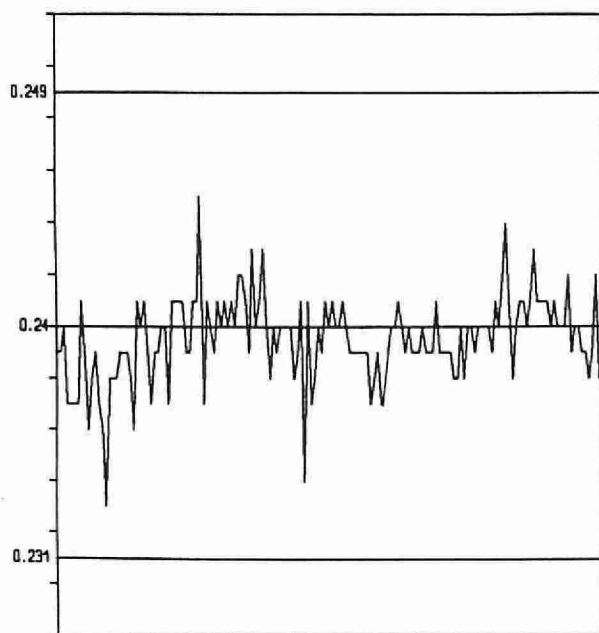
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
277	0.000 - 0.020	0.0021	63.9
74	0.020 - 0.050	0.0044	20.4
55	0.050 - 0.200	0.0043	6.3
405	Overall	0.0027	

OTHER CHECKS:

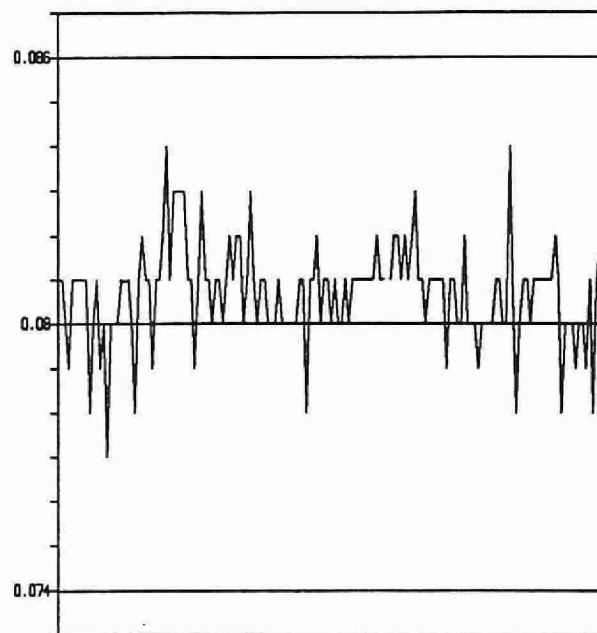
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	157	-0.0001	0.0006
Digested Blank	157	0.0017	0.0015

PHOSPHORUS, TOTAL (mg/L as P)

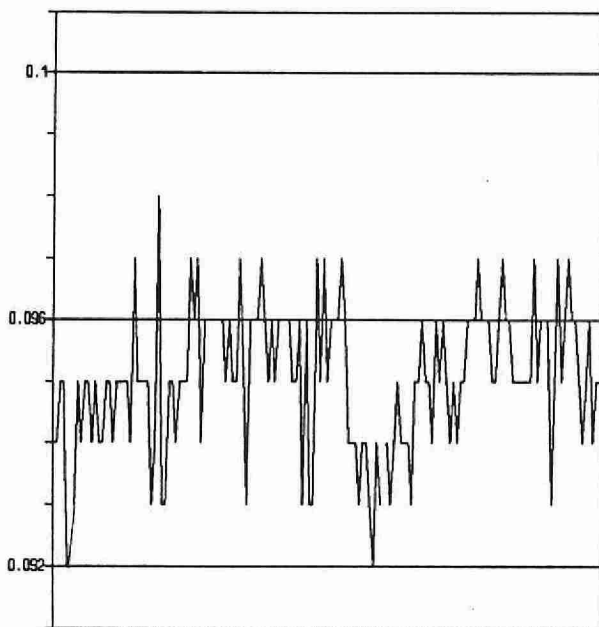
QUALITY CONTROL DATA FROM 03/01/91 TO 24/12/91



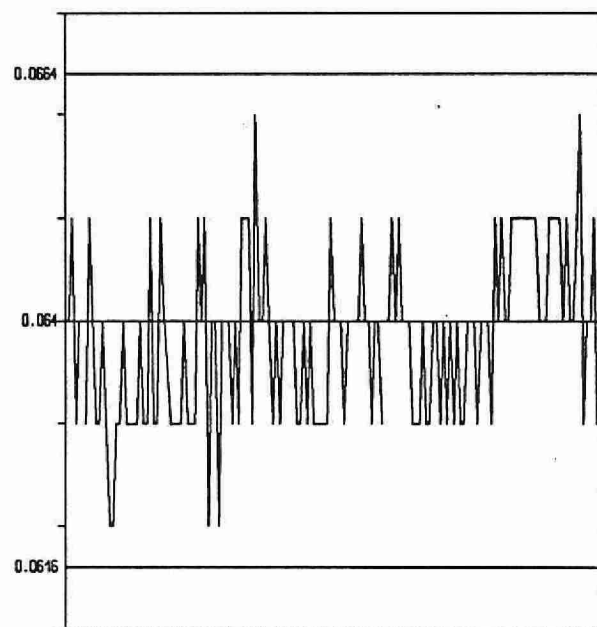
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: STKNP	Unit Code	: 064815
Method Code	: 504BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3200A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.8 at the full scale level.

Total Kjeldahl Nitrogen is determined simultaneously.

INSTRUMENTATION:

3-Block digesters

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using an IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 11/01/91 TO 24/12/91

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	149	8.0	8.008	0.008	0.0257
B :	149	4.0	4.004	0.004	0.0161
A+B :	149	12.0	12.012	0.012	0.0339
A-B :	149	4.0	4.005	0.005	0.0263
C :	149	4.0	4.004	0.004	0.0161
D :	149	0.8	0.801	0.001	0.0105
C+D :	149	4.8	4.805	0.005	0.0224
C-D :	149	3.2	3.202	0.002	0.0155

s.d.(AB) S(between runs): 0.021 Sw(within run): 0.019 S/Sw: 1.15

s.d.(CD) S(between runs): 0.014 Sw(within run): 0.011 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.55	-	12.45	for	A+B
3.70	-	4.30	for	A-B
4.62	-	4.98	for	C+D
3.08	-	3.32	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	149	7.0	6.81	0.202
R2 :	149	4.2	4.09	0.129
R3 :	149	1.4	1.36	0.050

DUPLICATES:

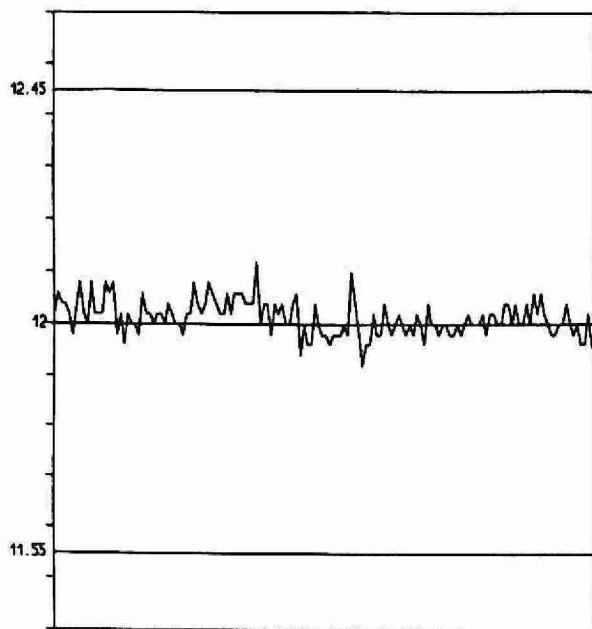
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
360	0.00	-	0.50	0.0134	221.6
32	0.50	-	1.00	0.0327	15.5
39	1.00	-	5.00	0.0770	15.5
5	5.00	-	10.00	0.2419	3.0
436	Overall			0.0178	

OTHER CHECKS:

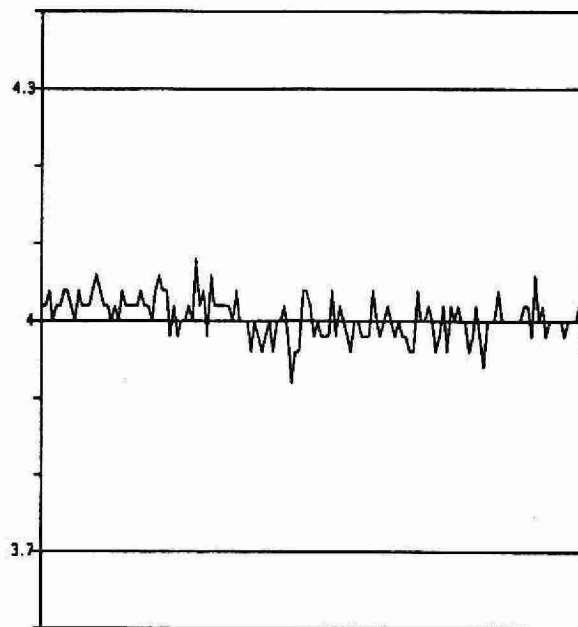
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	149	0.0026	0.008
Digested Blank	149	0.0062	0.009

PHOSPHORUS, TOTAL (mg/L as P)

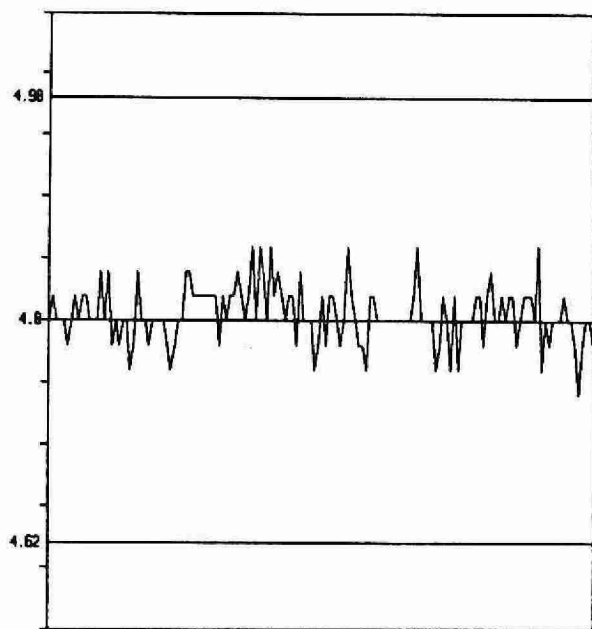
QUALITY CONTROL DATA FROM 11/01/91 TO 24/12/91



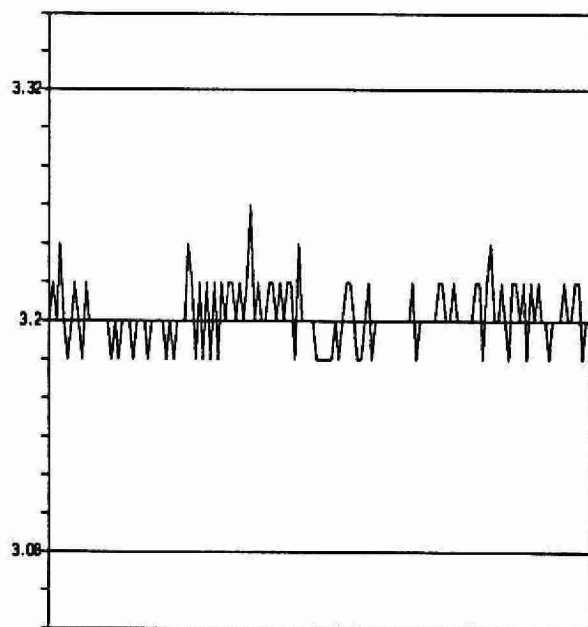
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 22/03/79
LIS Test Name Code	: PPUT1, PPUT2	Units	: ug/L as P
Work Station Code	: DOP	Unit Code	: 063815
Method Code	: 5926C2	Supervisor	: A. Neary
Method Reference No.	: E3036A		
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 35 mL
Container : Specially marked Pyrex culture tubes with Teflon-lined caps

ANALYTICAL PROCEDURE:

After withdrawal of excess volume, digestion reagent is added and samples are autoclaved in sulphuric acid-potassium persulphate media at 121°C for 60 min. The orthophosphate content of the digestate is determined colourimetrically by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Autoclave plus basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration : LTBL plus 4 undigested standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards, e.g. R1
Drift : BL every 10 samples and BL plus 1 undigested standard every 20 samples

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

The high bias encountered in (A+B) and (A-B) is currently under investigation.

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 01/01/91 TO 09/12/91

Lab: Dorset

Analytical Range: - to 100.0 ug/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	69	75.0	80.15	5.15	2.54
B :	69	25.0	25.44	0.44	1.18
A+B :	69	100.0	105.60	5.60	3.03
A-B :	69	50.0	54.70	4.70	2.56
C :	69	7.5	7.67	0.17	0.51
D :	69	2.5	2.10	-0.40	0.49
C+D :	69	10.0	9.77	-0.23	0.83
C-D :	69	5.0	5.57	0.57	0.56

s.d.(AB) S(between runs): 1.98 Sw(within run): 1.81 S/Sw: 1.09

s.d.(CD) S(between runs): 0.50 Sw(within run): 0.40 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

90	-	110	for	A+B
42.3	-	57.7	for	A-B
7.75	-	12.25	for	C+D
3.31	-	6.70	for	C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	69	70.0	71.41	2.11
R2 :	69	14.0	13.88	1.13
R3 :	69	7.0	7.00	0.97

DUPLICATES:

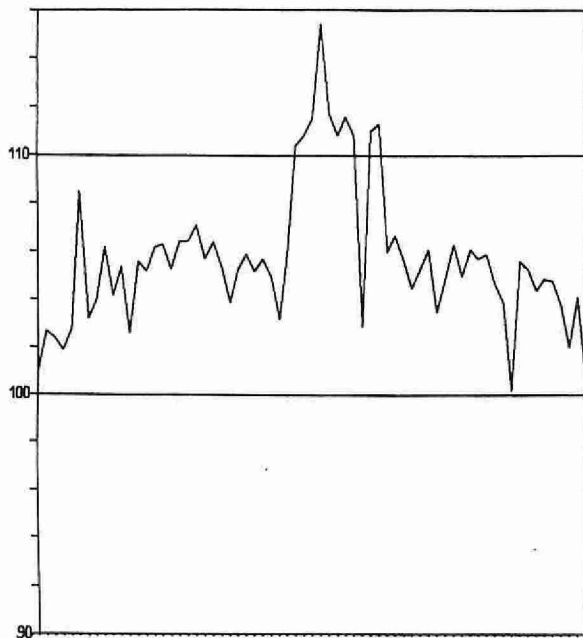
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
57	0.0 - 5.0	0.207	10.6
133	5.0 - 25.0	0.282	4.0
12	25.0 - 100.0	0.608	1.6
202	Overall	0.280	

OTHER CHECKS:

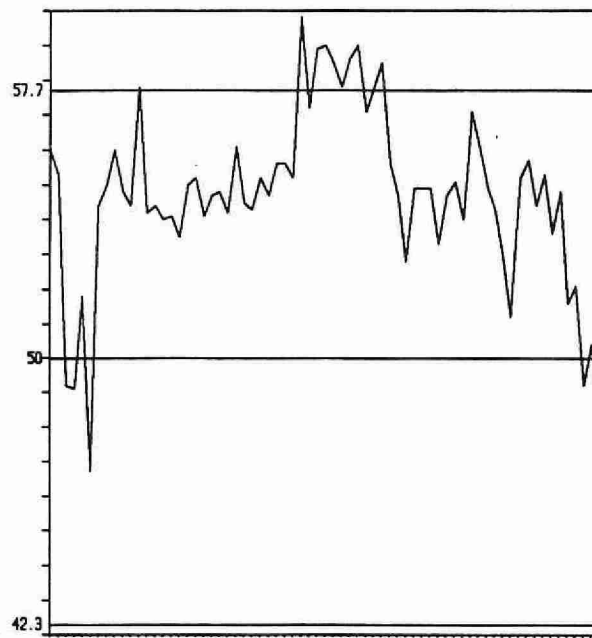
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	69	0.7	0.394
Digested Blank	69	0.8	0.484

PHOSPHORUS, TOTAL (ug/L as P)

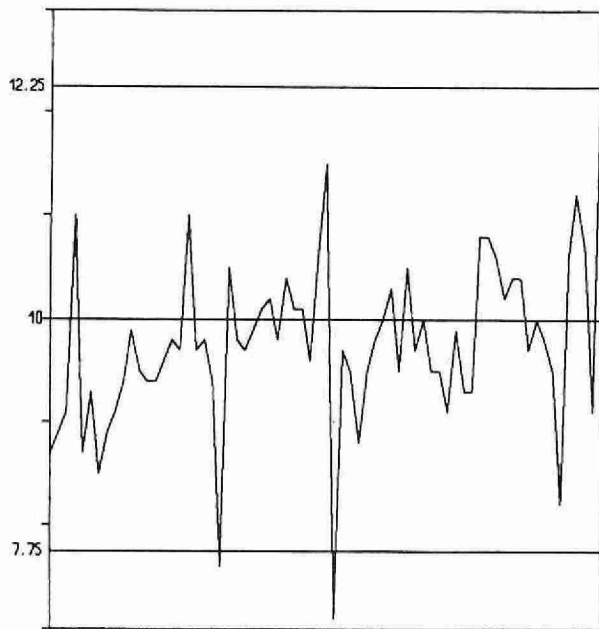
QUALITY CONTROL DATA FROM 01/01/91 TO 09/12/91



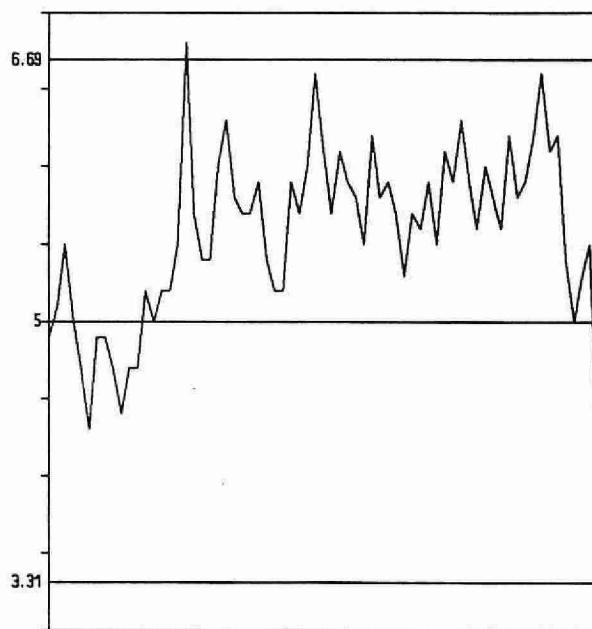
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAA400	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

POTASSIUM

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91

Lab: Atomic Absorption

Analytical Range: - to 1.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	49	0.60	0.6014	0.0014	0.0083
B :	49	0.10	0.1011	0.0011	0.0038
A+B :	49	0.70	0.7025	0.0025	0.0085
A-B :	49	0.50	0.5002	0.0002	0.0096

s.d.(AB) S(between runs): 0.006 Sw(within run): 0.007 S/Sw:0.94

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 - 0.75 for A+B
0.47 - 0.53 for A-B

DUPLICATES:

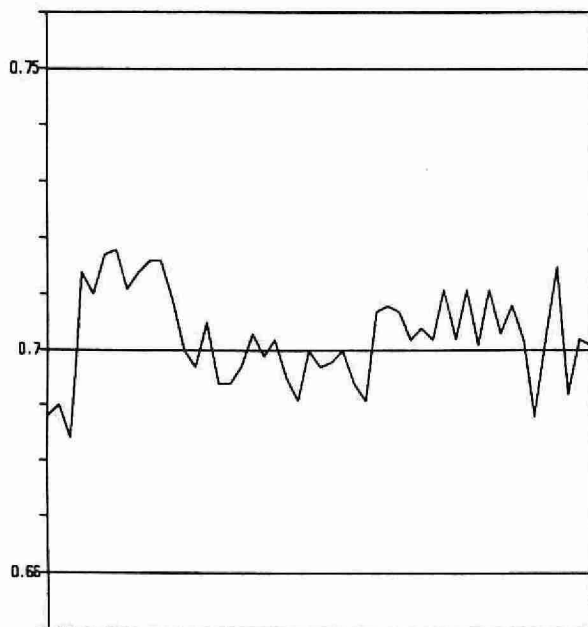
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
114	0.00	-	0.10	0.0015	17.8
11	0.10	-	0.20	0.0018	2.7
6	0.20	-	0.50	0.0055	1.7
3	0.50	-	1.00	0.0377	4.0
134	Overall			0.0018	

OTHER CHECKS:

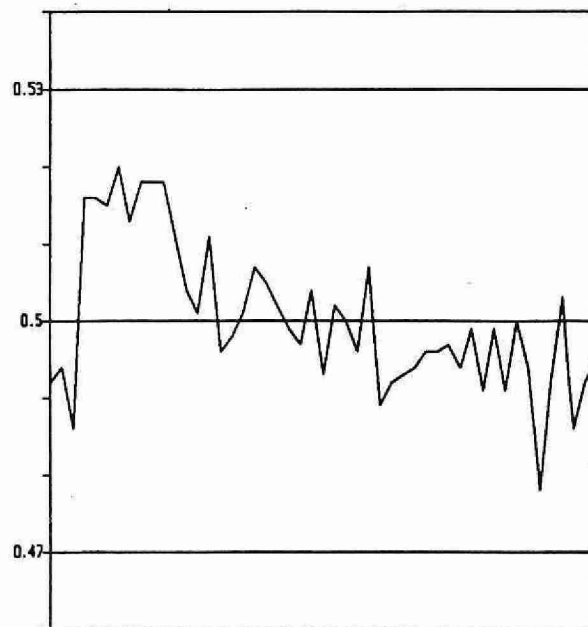
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	49	0.0014	0.0037

POTASSIUM (mg/L as K)

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

POTASSIUM

QUALITY CONTROL DATA FROM 08/01/91 TO 31/12/91

Lab: Atomic Absorption

Analytical Range: - to 1.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	122	0.80	0.798	-0.002	0.0060
B :	122	0.20	0.204	0.004	0.0028
A+B :	122	1.00	1.002	0.002	0.0070
A-B :	122	0.60	0.595	-0.005	0.0063
C :	122	0.20	0.204	0.004	0.0028
D :	122	0.05	0.052	0.002	0.0021
C+D :	122	0.25	0.255	0.005	0.0038
C-D :	122	0.15	0.152	0.002	0.0033

s.d.(AB) S(between runs): 0.0047 Sw(within run): 0.0045 S/Sw: 1.1

s.d.(CD) S(between runs): 0.0025 Sw(within run): 0.0023 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.955	-	1.045	for	A+B
0.570	-	0.630	for	A-B
0.205	-	0.295	for	C+D
0.120	-	0.180	for	C-D

DUPLICATES:

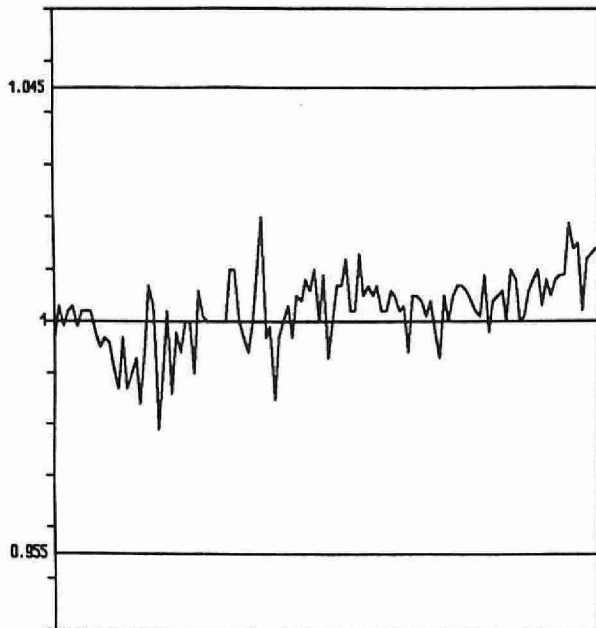
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
56	0.00 - 0.20	0.0036	4.5
126	0.20 - 0.50	0.0049	4.0
69	0.50 - 1.00	0.0091	2.9
251	Overall	0.0057	

OTHER CHECKS:

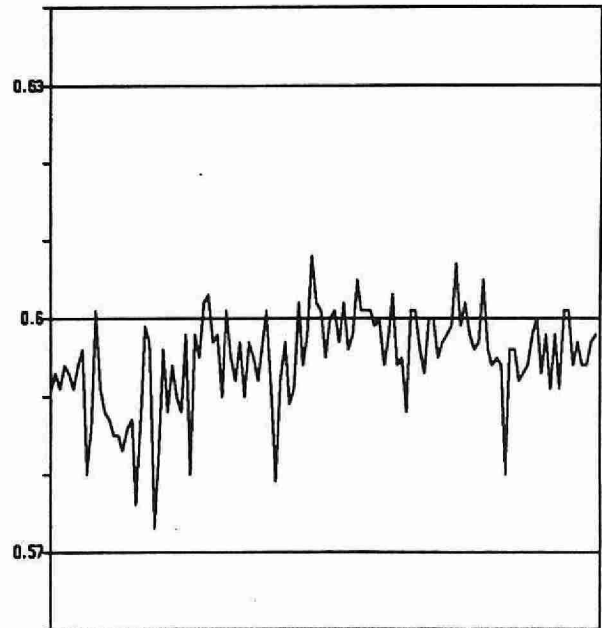
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	122	0.0028	0.007

POTASSIUM (mg/L as K)

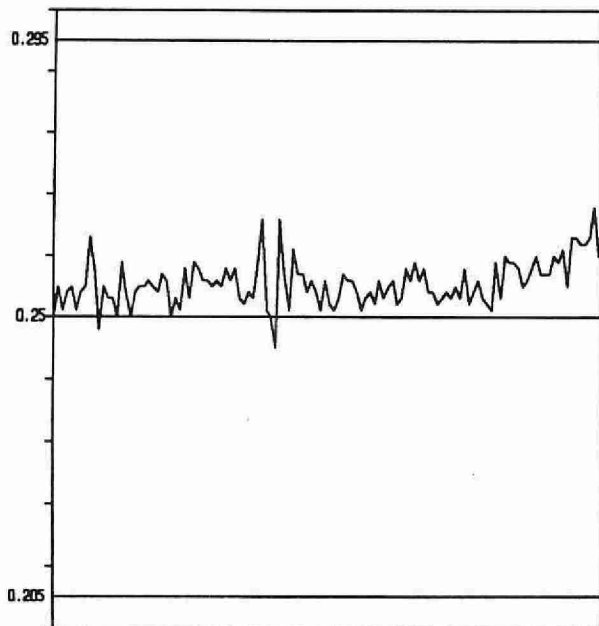
QUALITY CONTROL DATA FROM 08/01/91 TO 31/12/91



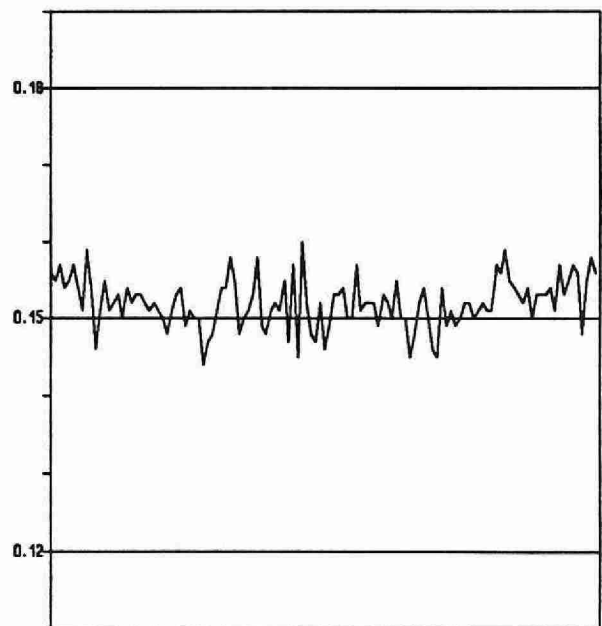
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: KKUR	Units	: ug/Filter as K
Work Station Code	: PRLOVAA	Unit Code	: 361819
Method Code	: 004BA3	Supervisor	: J. McBride
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at workstation PRAA400, at 766.5 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train. Results are converted to ug/filter as K.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.25	T value: 1.25
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard 10 samples

NOTES:

W and T values are those of the PRAA400 workstation multiplied by 50 to yield ug/filter.

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: RMAAS	Unit Code	: 064819
Method Code	: 0905A1	Supervisor	: J. McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.923 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

POTASSIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91

Lab: Atomic Absorption

Analytical Range: - to 5.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	75	4.00	3.991	-0.009	0.0680
B :	75	1.00	0.997	-0.003	0.0257
A+B :	75	5.00	4.988	-0.012	0.0746
A-B :	75	3.00	2.995	-0.005	0.0706
C :	75	1.00	0.997	-0.003	0.0257
D :	75	0.25	0.2496	-0.0004	0.0150
C+D :	75	1.25	1.246	-0.004	0.0356
C-D :	75	0.75	0.747	-0.003	0.0224

s.d.(AB) S(between runs): 0.051 Sw(within run): 0.050 S/Sw: 1.03

s.d.(CD) S(between runs): 0.021 Sw(within run): 0.016 S/Sw: 1.33

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.770	-	5.230	for	A+B
2.850	-	3.150	for	A-B
1.175	-	1.325	for	C+D
0.700	-	0.800	for	C-D

DUPLICATES:

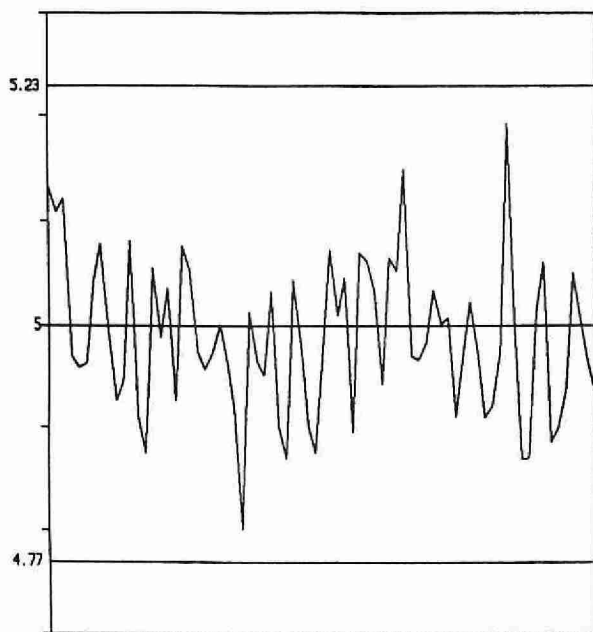
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
28	0.00	-	0.25	0.0066	6.7
61	0.25	-	1.00	0.0164	17.2
88	1.00	-	2.50	0.0412	5.3
25	2.50	-	5.00	0.0712	2.5
202	Overall			0.0300	

OTHER CHECKS:

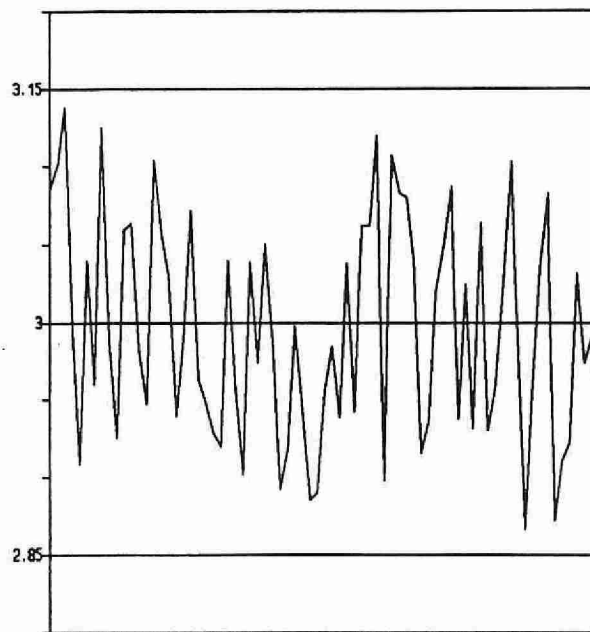
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	75	0.0213	0.0598

POTASSIUM (mg/L as K)

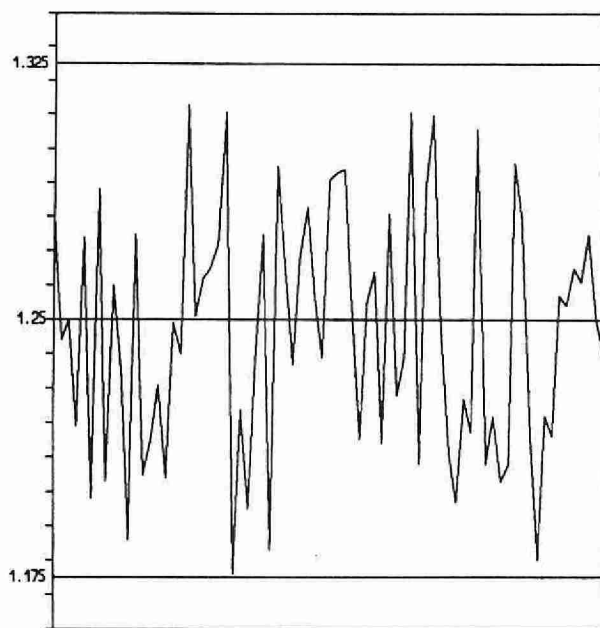
QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91



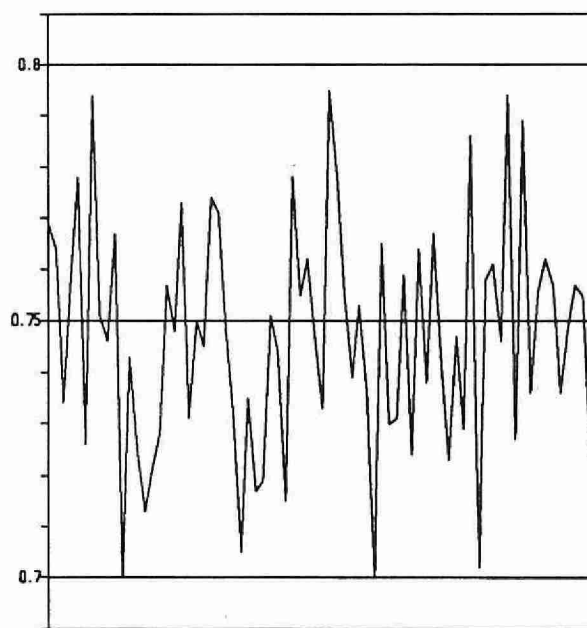
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: WAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 standards; 2 standards every 20 samples

NOTES:

Control limits were exceeded when a problem developed with injection timing. Corrective action was taken and optimization of the system was conducted by using a coloured dye solution to determine mid range of sample slug. Random selection of samples were re-analyzed to determine if the results were comparable after instrument optimization. The initial results were found acceptable based upon duplicate criteria.

POTASSIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 19/12/91

Lab: Atomic Absorption

Analytical Range: - to 25.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	81	20.00	20.03	0.03	0.3589
B :	81	5.00	5.02	0.02	0.1335
A+B :	81	25.00	25.05	0.05	0.4117
A-B :	81	15.00	15.01	0.01	0.3518
C :	81	5.00	5.02	0.02	0.1335
D :	81	1.25	1.26	0.01	0.0571
C+D :	81	6.25	6.28	0.03	0.1587
C-D :	81	3.75	3.76	0.01	0.1299

s.d.(AB) S(between runs): 0.27 Sw(within run): 0.25 S/Sw: 1.1

s.d.(CD) S(between runs): 0.10 Sw(within run): 0.09 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.8	-	26.2	for	A+B
14.2	-	15.8	for	A-B
5.65	-	6.85	for	C+D
3.35	-	4.15	for	C-D

DUPLICATES:

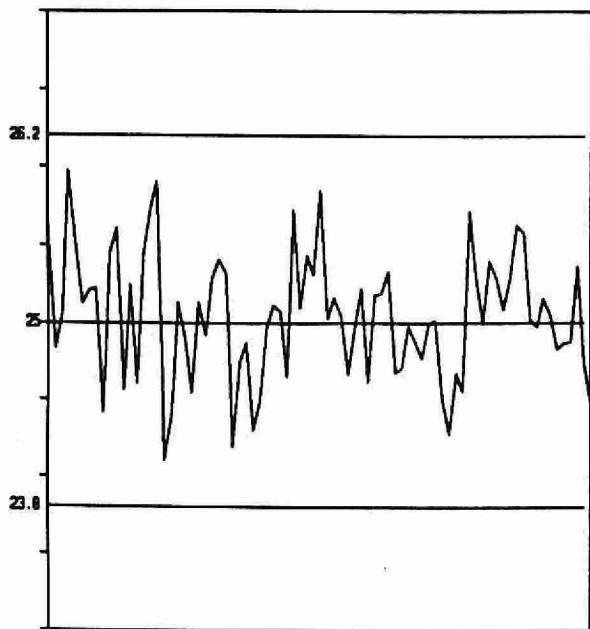
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
79	0.00	-	1.25	0.0408	16.6
84	1.25	-	2.50	0.0441	2.6
25	2.50	-	5.00	0.0656	2.7
27	5.00	-	25.00	0.2904	3.1
214	Overall			0.0566	

OTHER CHECKS:

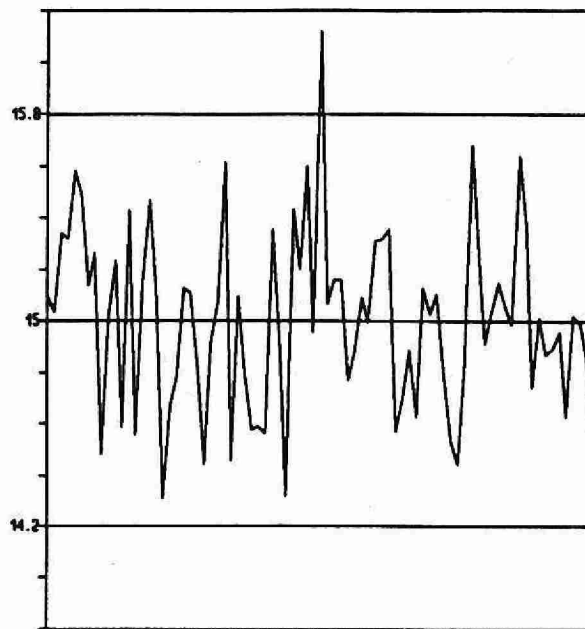
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	81	0.0016	0.1071

POTASSIUM (mg/L as K)

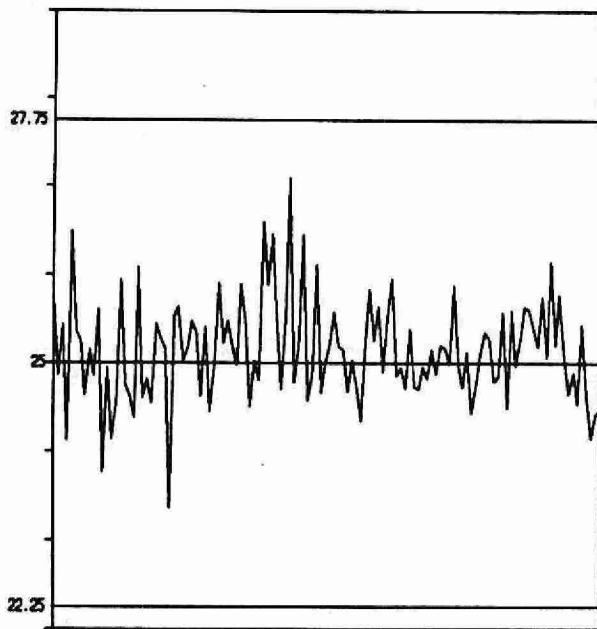
QUALITY CONTROL DATA FROM 02/01/91 TO 19/12/91



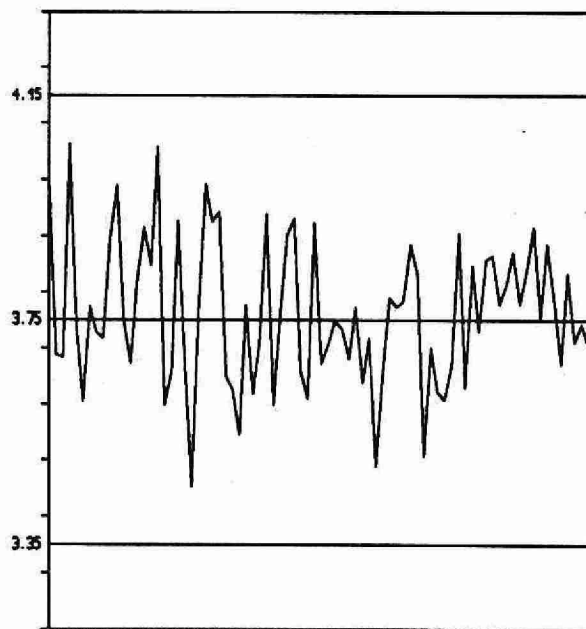
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** POTASSIUM, EXCHANGEABLE CATIONS *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: KKESC	Units	: meq/100 g
Work Station Code	: DOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for K by AAS at 766.5 nm with an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level. N.B. Aluminum, calcium, and magnesium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally)
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

POTASSIUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 07/01/91 TO 14/01/91

Lab: Dorset Soils

Analytical Range: - to 0.75 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	0.56	0.560	0.000	0.0183
B :	4	0.19	0.193	0.003	0.0126
A+B :	4	0.75	0.753	0.003	0.0171
A-B :	4	0.38	0.368	-0.013	0.0263

s.d.(AB) S(between runs): 0.016 Sw(within run): 0.019 S/Sw: 0.84

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 - 0.84 for A+B
0.31 - 0.44 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	0.418	0.0450
R2 :	4	0.146	0.0193
R3 :	4	0.120	0.0082

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.00 - 0.15	0.0105	38.122
4	0.15 - 0.25	0.0175	4.18
0	0.25 - 0.75	N.A.	N.A.
11	Overall	0.0118	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	4	0.00	0.000

*** SAND ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SAND	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Method Reference No.	: E3037A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction are dispersed in a sedimentation cylinder. The percentage of sand in the sample is determined by weighing the dried sieved fraction and expressing that as a percentage by weight of the total (sand, silt and clay) recovered.

INSTRUMENTATION:

-Sartorius 4 place digital balance (Handy)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus round robin ECSS samples (run occasionally).

SAND

QUALITY CONTROL DATA FROM 31/01/91 TO 25/03/91

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	6	59.333	1.366
R2 :	6	6.000	1.673

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.0 - 25.0	N.A	N.A
0	25.0 - 50.0	N.A	N.A
6	50.0 - 100.0	1.793	2.6
6	Overall	1.793	

*** SILICON, ACID AMMONIUM OXALATE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: SIEOX	Units	: % by wt as Si
Work Station Code	: DOMETOX	Unit Code	: 070814
Method Code	: 302AA5	Supervisor	: A. Neary
Method Reference No.	: E3032A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air-dried, disaggregated and sieved to less than 2 mm. A subsample is ground to <500 um (35 mesh).

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275

REPORTING:

Maximum Significant Figures: 2 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types, 2 method blanks, 2 QC solutions at 25% and 75% of scale, round robin ECSS samples.
Drift : BL plus 1 standard (100% F.S.) every 10 samples.

SILICON, ACID AMMONIUM OXALATE EXTRACTABLE

QUALITY CONTROL DATA FROM 11/02/91 TO 13/02/91

Lab: Dorset Soils

Analytical Range: - to 0.25 % wt. Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	0.1875	0.19	0.0025	0.000
B :	3	0.0625	0.06	0.0025	0.000
A+B :	3	0.2400	0.25	0.0100	0.000
A-B :	3	0.1200	0.13	0.0100	0.000

s.d.(AB) S(between runs): N.A. Sw(within run): N.A. S/Sw: N.A.

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	0.05	0.000
R2 :	3	0.21	0.026
R3 :	3	0.16	0.010

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
1	0.0	-	0.10	N.A.	N.A.
0	0.1	-	0.25	N.A.	N.A.
8	0.25	-	0.50	0.03	7.3
9	Overall			0.03	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	3	0.000	0.000

***** SILICON, REACTIVE SILICATES *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/02/75
LIS Test Name Code	: SIO3UR	Units	: mg/L as Si
Work Station Code	: ROM	Unit Code	: 064814
Method Code	: 001BC1	Supervisor	: M. Rawlings
Method Reference No.	: E3176A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents Domestic Water Supplies, Leachates		

SAMPLING:

Quantity Required	: 10 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference.

Approximate absorbance: 0.7 at the full scale level.

Dissolved inorganic and dissolved organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 660 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
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Drift	: BL every 10 samples; standards every 20 samples
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NOTES:

Calibration standard is a hydrate: $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$.

SILICON, REACTIVE SILICATES

QUALITY CONTROL DATA FROM 04/01/91 TO 20/12/91

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	182	8.0	7.98	-0.02	0.101
B :	182	2.0	1.99	-0.01	0.028
A+B :	182	10.0	9.97	-0.03	0.121
A-B :	182	6.0	5.99	-0.01	0.085
C :	182	2.0	1.99	-0.01	0.028
D :	182	0.5	0.53	0.03	0.024
C+D :	182	2.5	2.52	0.02	0.044
C-D :	182	1.5	1.46	-0.04	0.030

s.d.(AB) S(between runs): 0.07 Sw(within run): 0.05 S/Sw: 1.23

s.d.(CD) S(between runs): 0.03 Sw(within run): 0.02 S/Sw: 1.25

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.70	-	10.30	for	A+B
5.80	-	6.20	for	A-B
2.30	-	2.70	for	C+D
1.38	-	1.62	for	C-D

DUPLICATES:

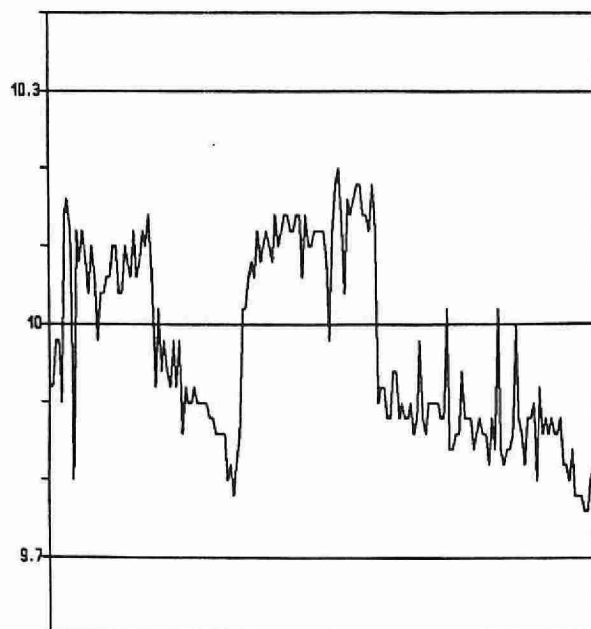
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
177	0.00	-	1.00	0.025	5.8
248	1.00	-	5.00	0.017	2.8
76	5.00	-	10.00	0.045	0.7
501	Overall			0.016	

OTHER CHECKS:

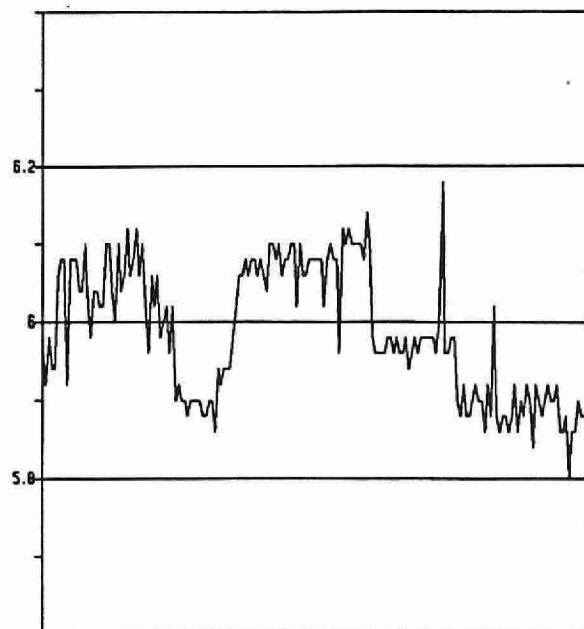
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	182	-0.0234	0.0182

SILICON, REACTIVE SILICATES (mg/L as Si)

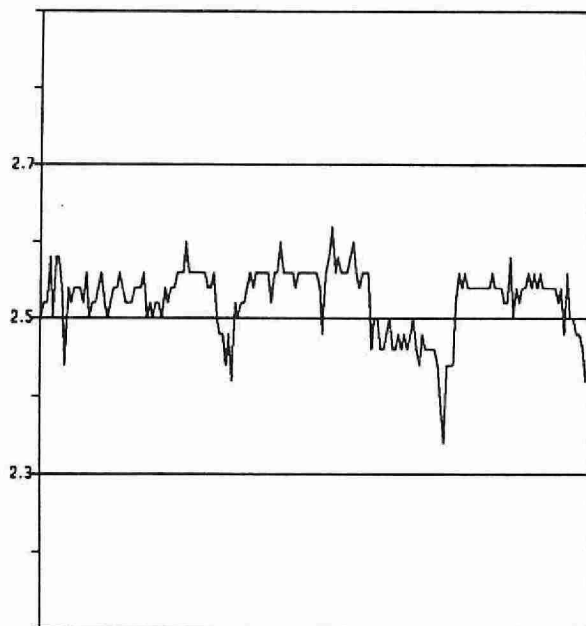
QUALITY CONTROL DATA FROM 04/01/91 TO 20/12/91



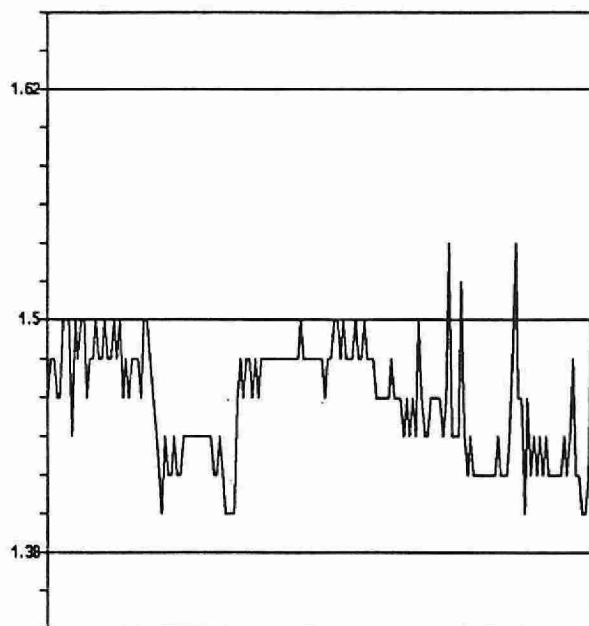
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** SILT ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SILT	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Method Reference No.	: E3037A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 20 g dry
Container	: Glass or plastic

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 μm) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of silt in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

- Sartorius 4 place digital balance (Handy)
- Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 1	T value: 5
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CALIBRATION:

Balance zero

CONTROLS:

Recovery	: 2 long term soil samples representing different soil types plus a round robin ECSS sample (run occasionally).
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SILT

QUALITY CONTROL DATA FROM 31/01/91 TO 25/03/91

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Conc Measured	Standard(1) Deviation
R1 :	5	40.0	1.73
R2 :	5	40.4	8.76

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
0	0.0	-	20.0	N.A.	N.A.
5	20.0	-	50.0	1.756	4.09
0	50.0	-	100.0	N.A.	N.A.
5	Overall			1.756	

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAA400	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J. McBride
Method Reference No	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

SODIUM

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91

Lab: Atomic Absorption

Analytical Range: - to 1.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	53	0.60	0.6006	0.0006	0.0063
B :	53	0.10	0.1010	0.0010	0.0033
A+B :	53	0.70	0.7016	0.0016	0.0073
A-B :	53	0.50	0.4995	-0.0005	0.0070

s.d.(AB) Sw(within run): 0.0051 S(between runs): 0.0050 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 - 0.75 for A+B
0.47 - 0.53 for A-B

DUPLICATES:

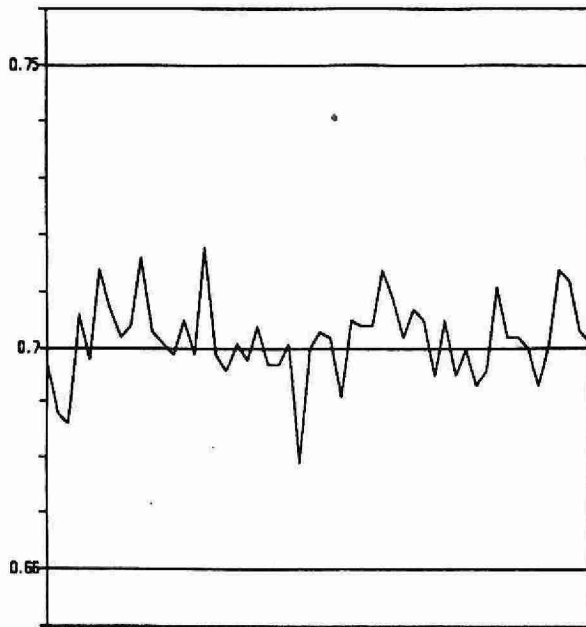
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
107	0.00	-	0.10	0.0015	4.9
25	0.10	-	0.20	0.0023	4.1
12	0.20	-	0.50	0.0066	2.6
5	0.50	-	1.00	0.0039	0.6
149	Overall			0.0020	

OTHER CHECKS:

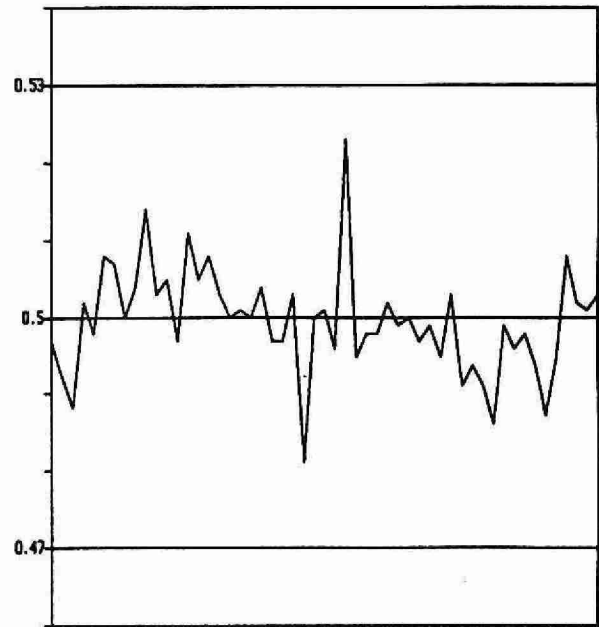
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	53	-0.00021	0.0043

SODIUM (mg/L as Na)

QUALITY CONTROL DATA FROM 15/01/91 TO 19/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J.McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

SODIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 31/12/91

Lab: Atomic Absorption

Analytical Range: - to 4.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	3.2	3.205	0.005	0.0189
B :	118	0.8	0.810	0.010	0.0075
A+B :	118	4.0	4.015	0.015	0.0271
A-B :	118	2.4	2.394	-0.006	0.0216
C :	118	0.8	0.810	0.010	0.0075
D :	118	0.2	0.208	0.008	0.0051
C+D :	118	1.0	1.018	0.018	0.0076
C-D :	118	0.6	0.603	0.003	0.0103

s.d.(AB) S(between runs): 0.014 Sw(within run): 0.013 S/Sw:1.1

s.d.(CD) S(between runs): 0.006 Sw(within run): 0.007 S/Sw:0.9

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.82	-	4.18	for	A+B
2.28	-	2.52	for	A-B
0.82	-	1.18	for	C+D
0.48	-	0.72	for	C-D

DUPLICATES:

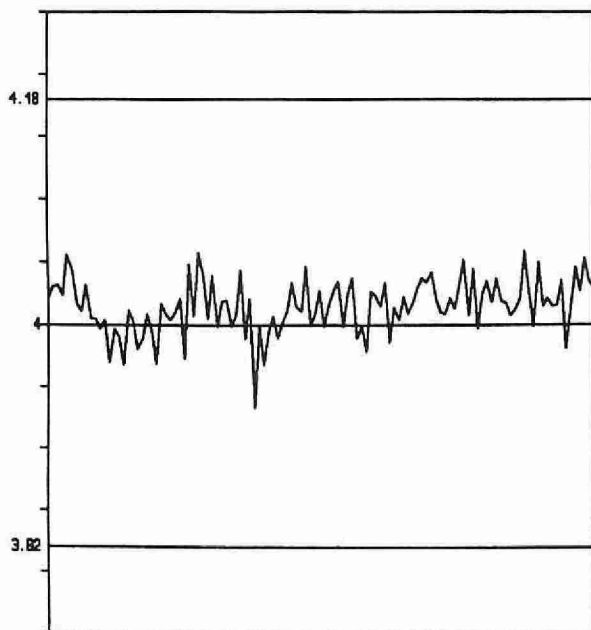
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
46	0.00 - 0.60	0.0067	1.7
118	0.60 - 1.00	0.0117	3.1
76	1.00 - 2.00	0.0230	6.0
50	2.00 - 4.00	0.0332	1.9
290	Overall	0.0165	

OTHER CHECKS:

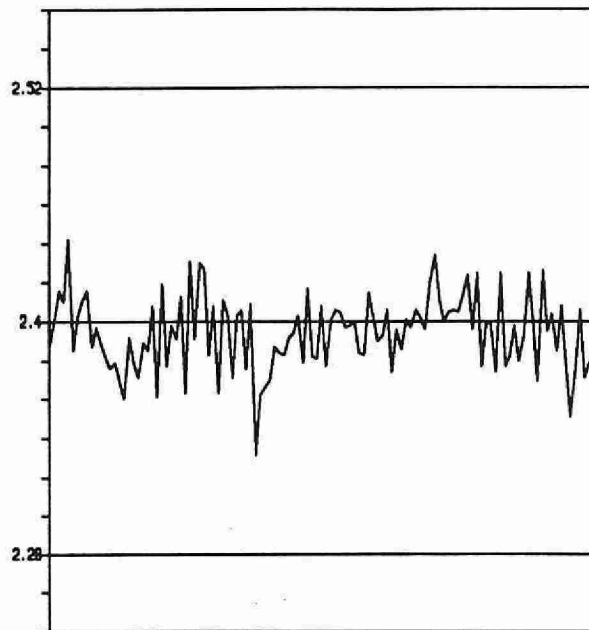
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	0.0037	0.0057

SODIUM (mg/L as Na)

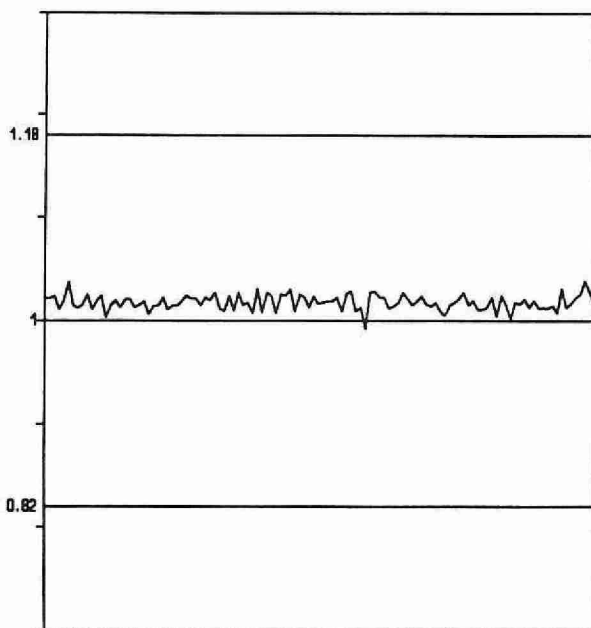
QUALITY CONTROL DATA FROM 02/01/91 TO 31/12/91



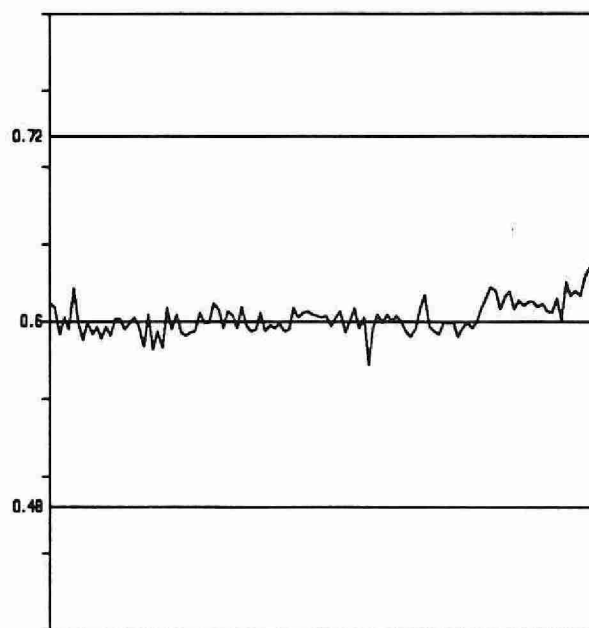
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: NAUR	Units	: ug/Filter as Na
Work Station Code	: PRLOVAA	Unit Code	: 361811
Method Code	: 004AA3	Supervisor	: J. McBride
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at workstation PRAA400, at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train. Results are converted to ug/filter as Na.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.25	T value: 1.25
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CALIBRATION:

BL plus 5 standards.

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W and T values are those of the PRAA400 workstation multiplied by 50 to yield ug/filter.

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: RMAAS	Unit Code	: 064811
Method Code	: 0905A1	Supervisor	: J. McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.

Approximate absorbance: 1.16 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

SODIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91

Lab: Atomic Absorption

Analytical Range: - to 20.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	74	16.0	15.968	-0.032	0.2137
B :	74	4.0	3.979	-0.021	0.0744
A+B :	74	20.0	19.947	-0.053	0.2602
A-B :	74	12.0	11.990	-0.010	0.1863
C :	74	4.0	3.979	-0.021	0.0744
D :	74	1.0	1.005	0.005	0.0447
C+D :	74	5.0	4.984	-0.016	0.0998
C-D :	74	3.0	2.974	-0.026	0.0714

s.d.(AB) S(between runs): 0.16 Sw(within run): 0.13 S/Sw: 1.2

s.d.(CD) S(between runs): 0.061 Sw(within run): 0.05 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.4	-	20.6	for	A+B
11.6	-	12.4	for	A-B
4.7	-	5.3	for	C+D
2.8	-	3.2	for	C-D

DUPLICATES:

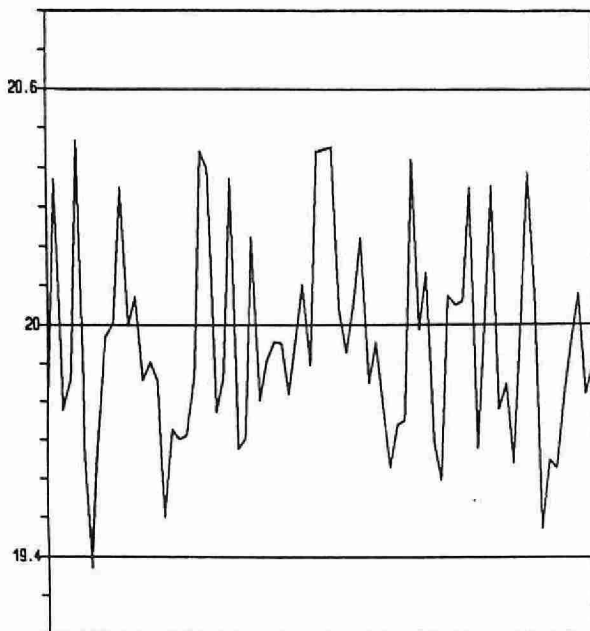
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
42	0.00	-	1.00	0.0265	4.6
14	1.00	-	2.00	0.0351	2.5
22	2.00	-	5.00	0.0619	1.7
16	5.00	-	10.00	0.1901	2.9
22	10.00	-	20.00	0.2497	2.2
116	Overall			0.0799	

OTHER CHECKS:

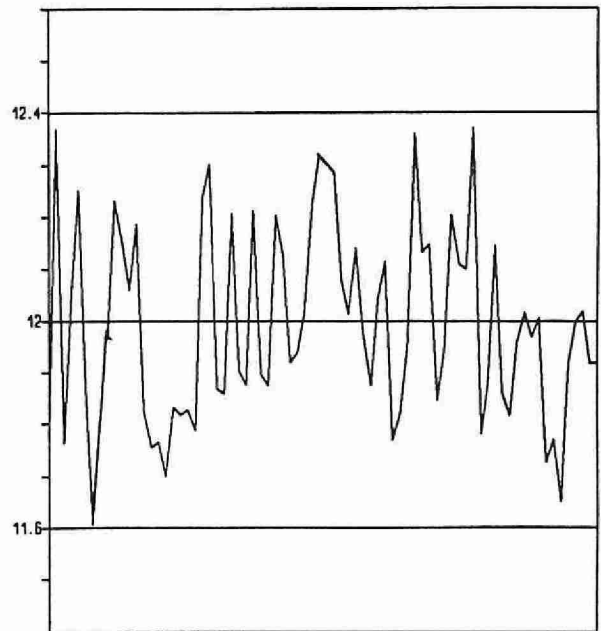
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	75	0.0291	0.1189

SODIUM (mg/L as Na)

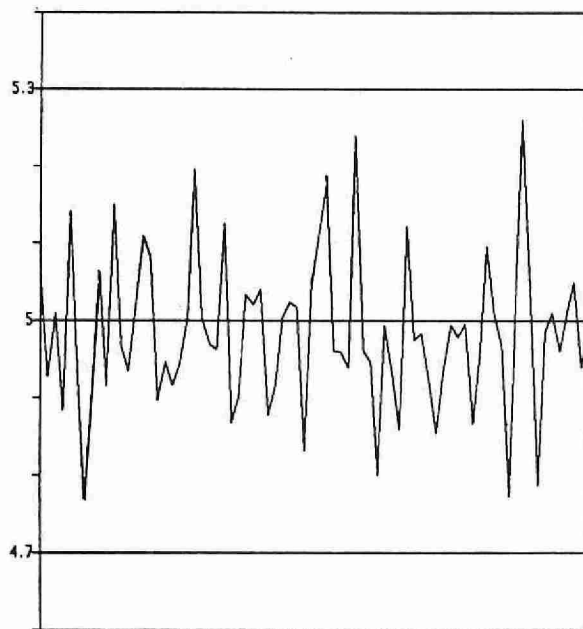
QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91



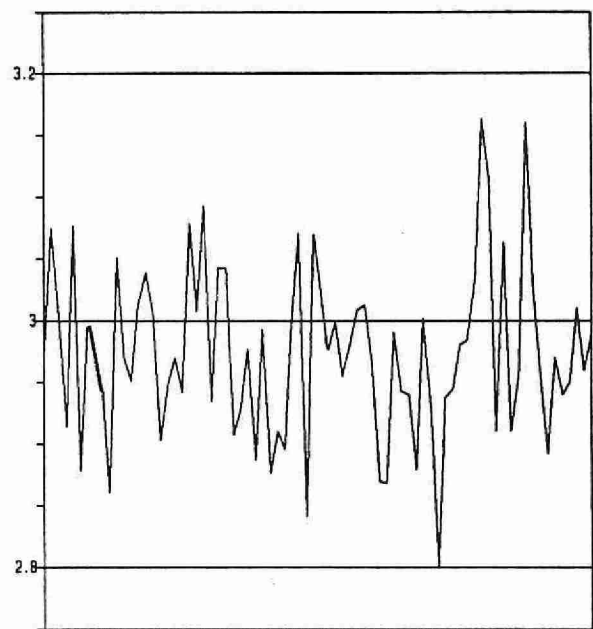
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: WAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J.McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.21 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

NOTES:

Control limits were exceeded when a problem developed with injection timing. Corrective action was taken and optimization of the system was conducted by using a coloured dye solution to determine mid range of sample slug. Random selection of samples were re-analyzed to determine if the results were comparable after instrument optimization. The initial results were found acceptable based upon duplicate criteria.

SODIUM

QUALITY CONTROL DATA FROM 02/01/91 TO 20/12/91

Lab: Atomic Absorption

Analytical Range: - to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	124	80.0	79.93	-0.07	1.3268
B :	124	20.0	20.11	0.11	0.4762
A+B :	124	100.0	100.04	0.04	1.5284
A-B :	124	60.0	59.82	-0.18	1.2798
C :	124	20.0	20.11	0.11	0.4762
D :	124	5.0	5.03	0.03	0.2019
C+D :	124	25.0	25.14	0.14	0.5775
C-D :	124	15.0	15.09	0.09	0.4488

s.d.(AB) S(between run): 0.99 Sw(within run): 0.90 S/Sw: 1.1

s.d.(CD) S(between run): 0.37 Sw(within run): 0.32 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.50	-	104.50	for	A+B
57.00	-	63.00	for	A-B
22.25	-	27.75	for	C+D
13.50	-	16.50	for	C-D

DUPLICATES:

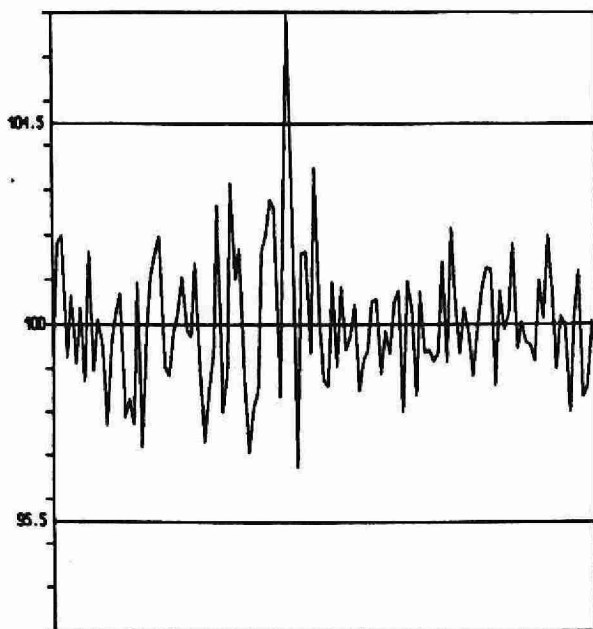
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
114	0.0	-	10.0	0.1620	3.8
94	10.0	-	25.0	0.4132	2.7
46	25.0	-	50.0	0.6533	2.4
36	50.0	-	100.0	1.7005	2.3
320	Overall			0.3613	

OTHER CHECKS:

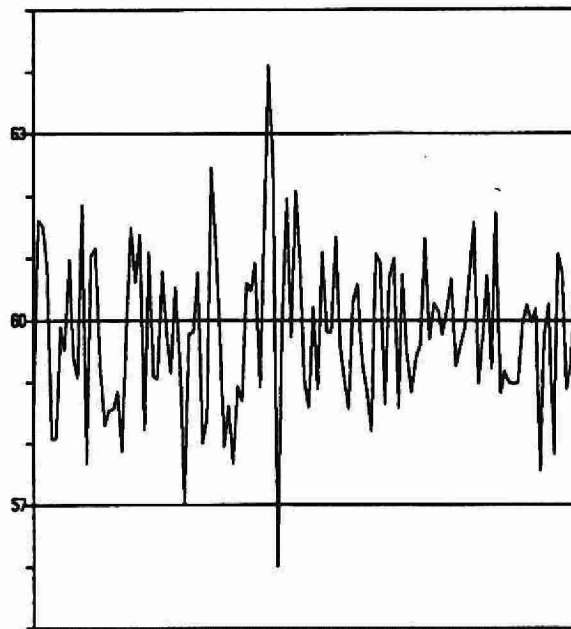
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	124	-0.0067	0.5319

SODIUM (mg/L as Na)

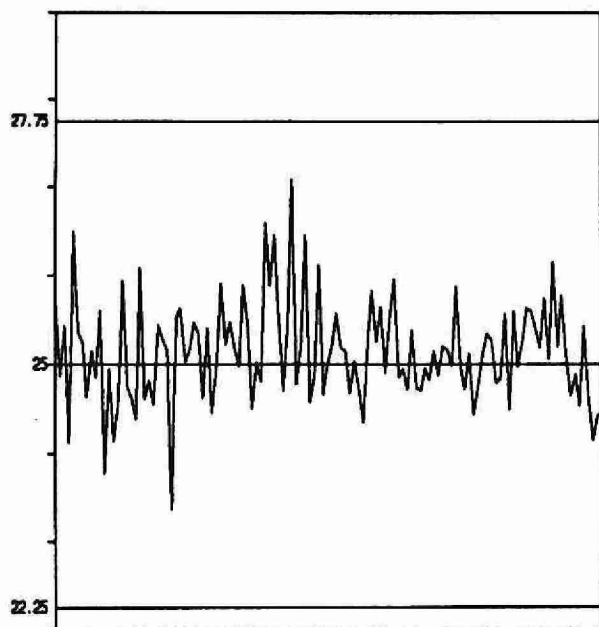
QUALITY CONTROL DATA FROM 02/01/91 TO 20/12/91



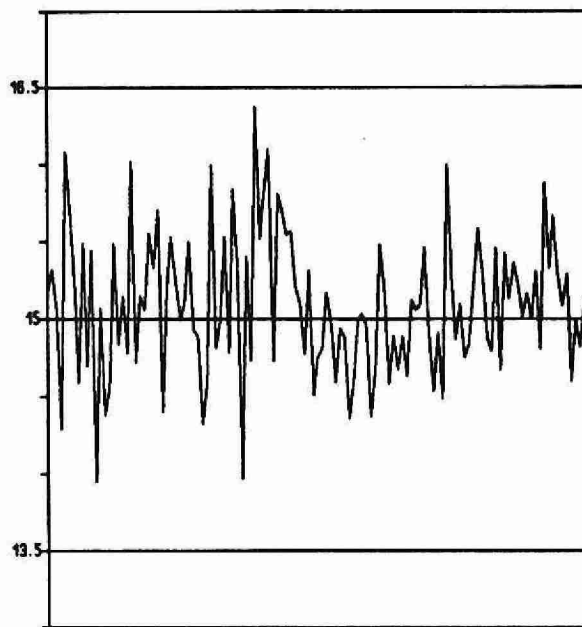
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** SOLIDS, DISSOLVED *****

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 106AB4	Supervisor	: J.McBride
Method Reference No	: E3188A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Surface Waters, Leachates		

SAMPLING:

Quantity Required : 125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH glass fibre filter. 50 or 100 mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing the dish the dissolved solids content is calculated by subtracting the original dish mass from the dried dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), drying oven, suction filtration apparatus, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration : 2 S class weights, e.g. QCA
Recovery : LTBL plus 2 standards, e.g. R1
Drift : Balance zero is checked every 10 dishes.

NOTES:

Correction factor for dish tare weights is included in the calculation, based on variations of a standard sealed vessel.
Two balances are used for all solids analyses. Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.
Duplicates in the lowest range class were generally too high to use to recalculate the W value.

SOLIDS, DISSOLVED

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Solids

Analytical Range: - to 5000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured	Av. Bias	Standard(1) Deviation
A :	117	50.00	50.00001	0.00001	0.00010
B :	117	30.00	29.99990	-0.00010	0.00010
A+B :	117	80.00	79.99992	-0.00008	0.00015
A-B :	117	20.00	20.00010	0.00010	0.00013

s.d.(AB) S(between runs): 0.0001 Sw(within run): 0.0001 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

79.99900 - 80.00100 for A+B
19.99925 - 20.00075 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured	Standard(1) Deviation
R1 :	91	2000.0	1992.8	22.0
R2 :	90	500.0	492.86	12.7

DUPLICATES:

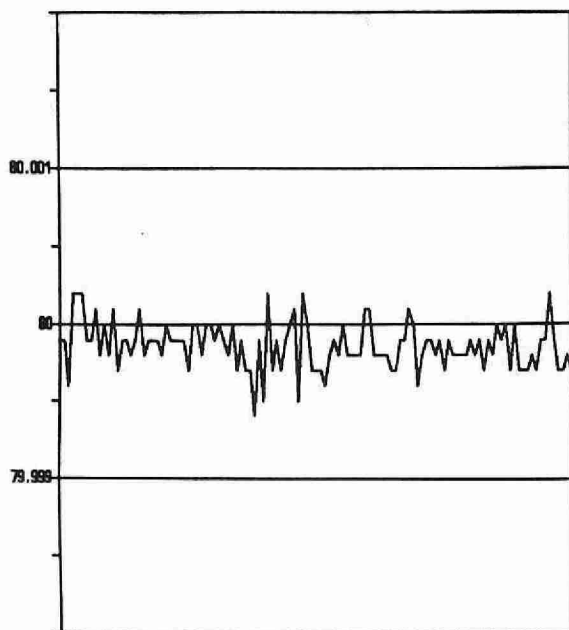
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
19	0 - 250	10.50	14.9
45	250 - 500	14.06	9.6
31	500 - 1000	18.55	3.5
16	1000 - 5000	47.40	5.7
111	Overall	18.91	

OTHER CHECKS:

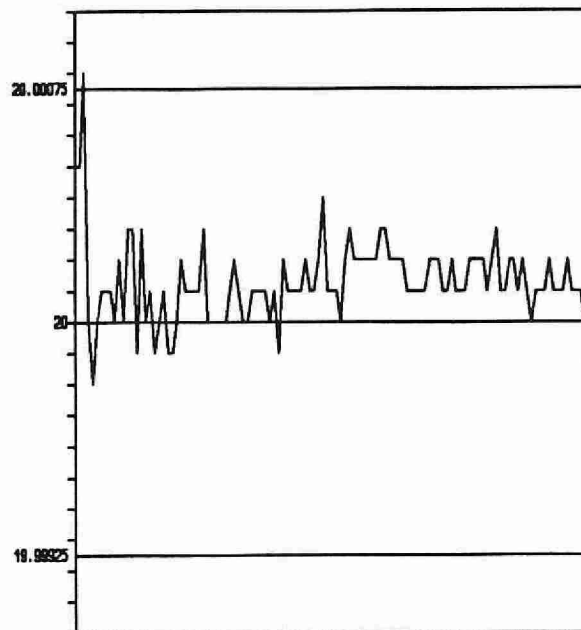
	Number of Data	Data Mean	Standard(1) Deviation
Blank	96	-0.26709	5.069

SOLIDS, DISSOLVED (mg/L)

QUALITY CONTROL DATA FROM 01/01/91 TO 30/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** SOLIDS, IGNITED *****
(Particulate Loss on Ignition)

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSPLOI	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: CALC07	Supervisor	: J. McBride
Method Reference No.	: E3194A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for particulate solids (RSP) is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The particulate loss on ignition (estimate of volatile suspended solids) is the difference between the final ignited mass plus filter and the RSP residue plus filter, divided by the original sample volume (mL) used for RSP. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), muffle furnace, ceramic dishes, Petri dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Drift	: Balance zero is checked at least every 20 dishes.

NOTES:

Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS, IGNITED
(Particulate Loss on Ignition)

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Solids

Analytical Range: - to 3,000 mg/L

CALIBRATION CONTROL

	Number of Data	Expected Mass (g)	Av. Mass Measured	Standard(1) Deviation
A :	33	0.50	0.49998	0.000013
B :	33	0.05	0.04999	0.000014
A+B :	33	0.55	0.54998	0.000024
A-B :	33	0.45	0.44999	0.000014

s.d.(AB) S(between runs): 0.000014 Sw(within run): 0.000010 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

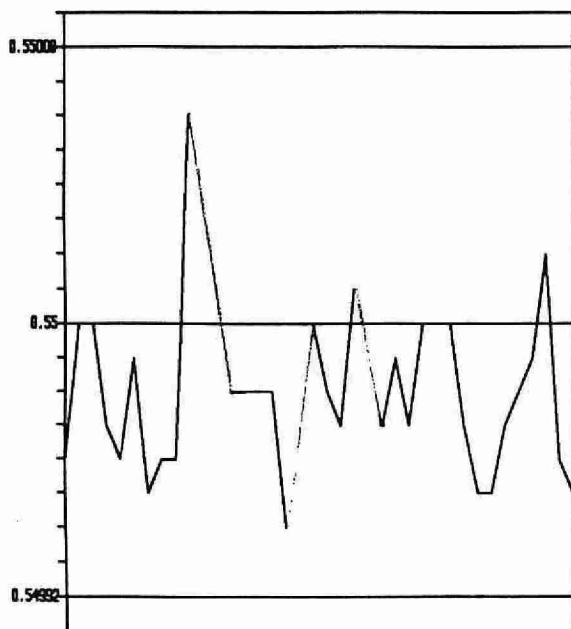
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
11	0.0	-	10.0	0.3461	6.1
12	10.0	-	50.0	1.5501	7.9
5	50.0	-	200.0	0.9806	2.5
1	200.0	-	3000.0	N.A.	N.A.
29	Overall			0.9859	

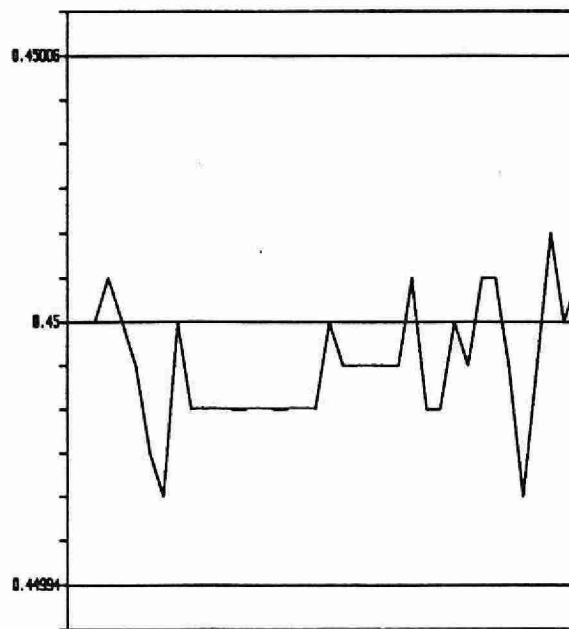
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Blank	16	-0.3075	0.2405

SOLIDS, IGNITED (mg/L)
(Particulate Loss on Ignition)
QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** SOLIDS, PARTICULATE *****

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSP	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 206AB5	Supervisor	: J.McBride
Method Reference No.	: E3190A		
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents and Surface Waters		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (5 to 500 mL) is pipetted or quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The graduated cylinder and then the filter are washed with a total of 30 mL distilled water. The filter is dried at 103-105°C, and suspended solids content is calculated by subtracting the original filter mass from the dried filter mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5-decimal places), drying oven, suction filtration apparatus
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA for each balance (results in grams)
Recovery	: LTBL plus 2 standards, e.g. R1
Drift	: Balance zero is checked every tenth weighing.
Blank	: Filter washed with 500 mL distilled water,

NOTES:

A standard correction factor was applied to all filters to account for weight loss during filtering (-0.0003g). QC data were obtained from two balances. Currently tests on sewage are performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS, PARTICULATE

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Solids

Analytical Range: - to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured	Av. Bias	Standard(1) Deviation
A :	124	0.50	0.499987	-0.000013	0.000011
B :	124	0.05	0.049990	-0.000010	0.000011
A+B :	124	0.55	0.549977	-0.000023	0.000019
A-B :	124	0.45	0.449997	-0.000003	0.000012

s.d.(AB) S(between runs): 0.000011 Sw(within run): 0.000008 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured	Standard(1) Deviation
R1 :	160	200.0	193	20.6
R2 :	160	50.0	49.5	5.1

DUPLICATES:

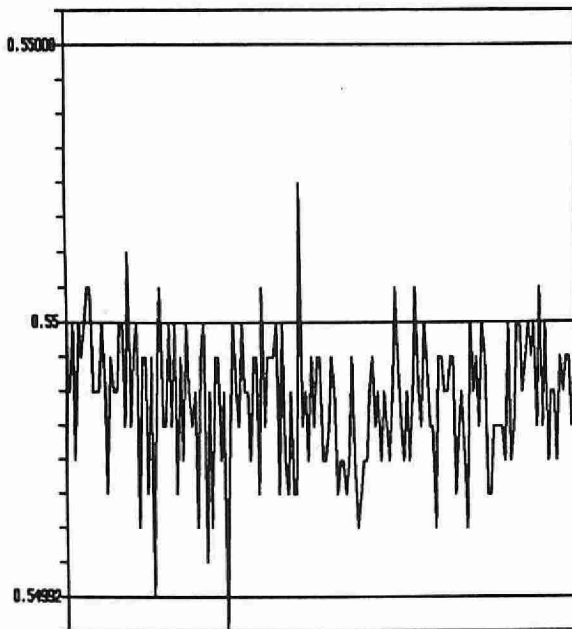
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
27	0.0 - 10.0	1.8796	32.9
34	10.0 - 25.0	2.4374	18.0
85	25.0 - 100.0	4.2523	17.7
92	100.0 - 500.0	17.5330	10.5
21	500.0 - 3000.0	35.8317	7.3
259	Overall	8.8822	

OTHER CHECKS:

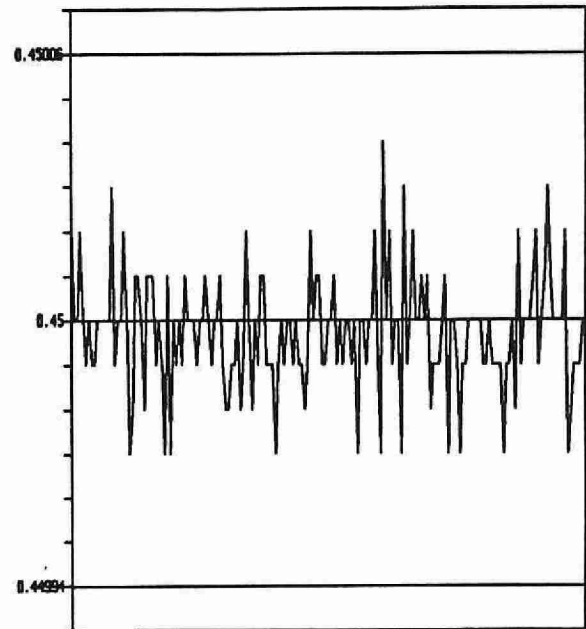
	Number of Data	Data Mean	Standard(1) Deviation
Blank	171	0.2146	0.5498

SOLIDS, PARTICULATE (mg/L)

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** SOLIDS, TOTAL *****

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RST	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 506AB4	Supervisor	: J. McBride
Method Reference No.	: E3192A		
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents, Sludge		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

A 50.0 or 100 mL aliquot of sample is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing, the total residue or solids content is calculated by subtracting the original dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), drying oven, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA (results in grams)
Recovery	: BL plus 2 standards, e.g. R1
Drift	: Balance zero is checked every tenth weighing

NOTES:

Correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in the calculation. QC data were obtained from two balances that are used for all solids analyses. The calibration control data are the same used for Dissolved Solids. Currently tests on sewage are performed by a private laboratory. Insufficient tests were performed at the Central Laboratory to provide a data summary.

SOLIDS, TOTAL

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Solids

Analytical Range: - to 60000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured	Av. Bias	Standard(1) Deviation
A :	55	50.00	50.00001	0.00001	0.00011
B :	55	30.00	29.99988	-0.00012	0.00013
A+B :	55	80.00	79.99990	-0.00010	0.00021
A-B :	55	20.00	20.00013	0.00013	0.00011

s.d.(AB) S(between runs): 0.000119 Sw(within run): 0.000079 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

79.99900 - 80.00100 for A+B
19.99925 - 20.00075 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured	Standard(1) Deviation
R1 :	54	20000.0	20020.0	109.4
R2 :	54	2000.0	2000.1	26.1

DUPLICATES:

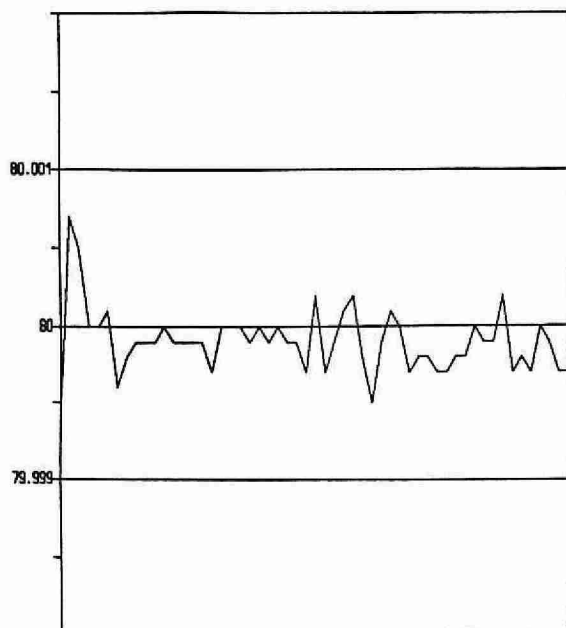
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
9	0.0 - 100.0	2.7655	4.6
10	100.0 - 500.0	5.6094	3.8
3	500.0 - 2000.0	81.3566	4.9
0	2000.0 - 60000.0	N.A.	N.A.
22	Overall	6.4324	

OTHER CHECKS:

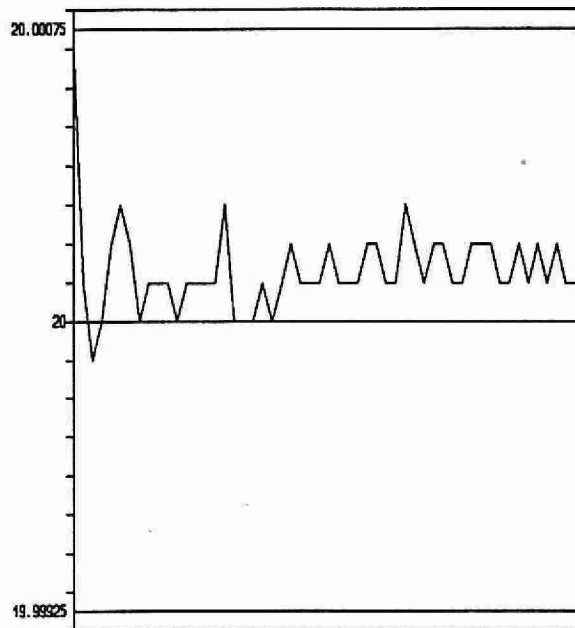
	Number of Data	Data Mean	Standard(1) Deviation
Blank	55	-0.12963	5.1183

SOLIDS, TOTAL (mg/L OR mg/Kg)

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO4FR,SSO4NF	Units	: ug/Filter as SO ₄
Work Station Code	: PRSEQ	Unit Code	: 361941
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: Nylon (SSO4NF) filters from LoVol and sequential filter packs, and Teflon (SSO4FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as SO₄. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE
(SSO4FR)

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 250 ug/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	70	200	200.16	0.16	1.896
B :	70	50	50.22	0.22	1.020
A+B :	70	250	250.39	0.39	2.251
A-B :	70	150	149.94	-0.06	2.050

s.d.(AB) S(between runs): 1.52 Sw(within run): 1.44 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

239 - 261 for A+B
143 - 157 for A-B

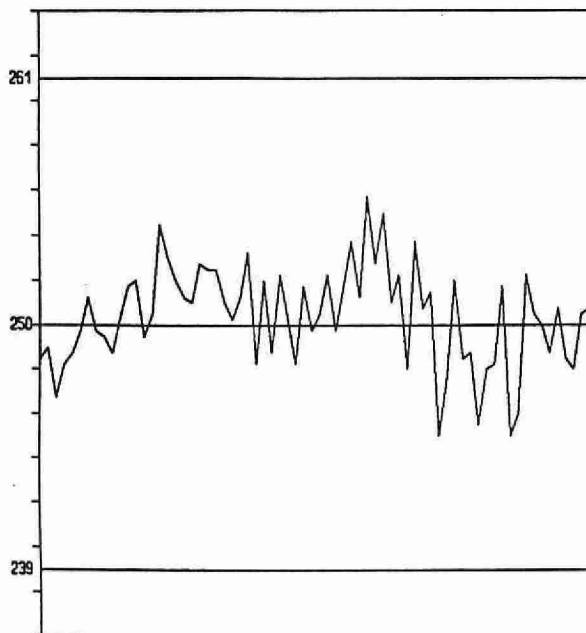
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
49	0.0 - 25.0	0.279	129.8
61	25.0 - 100.0	1.104	29.7
21	100.0 - 250.0	1.298	43.3
131	Overall	0.765	

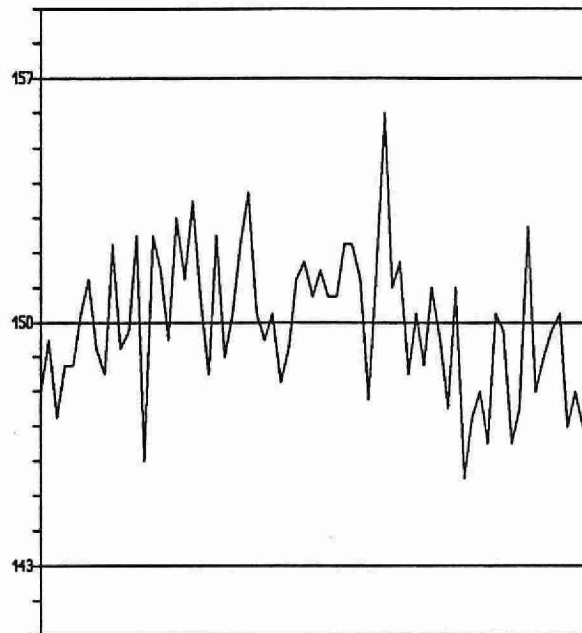
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	70	0.003	0.016

SULPHATE (ug/filter as SO₄)
(SSO4FR)
QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

SULPHATE
(SSO4NF)

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 250 ug/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	68	200.0	200.02	0.02	1.936
B :	68	50.0	50.12	0.12	1.222
A+B :	68	250.0	250.15	0.15	2.285
A-B :	68	150.0	149.90	-0.10	2.294

s.d.(AB) S(between runs): 1.62 Sw(within run): 1.62 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

239 - 261 for A+B
143 - 157 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
56	0	-	25	0.546	6.5
29	25	-	50	1.029	5.7
37	50	-	250	1.427	2.6
122	Overall			0.753	

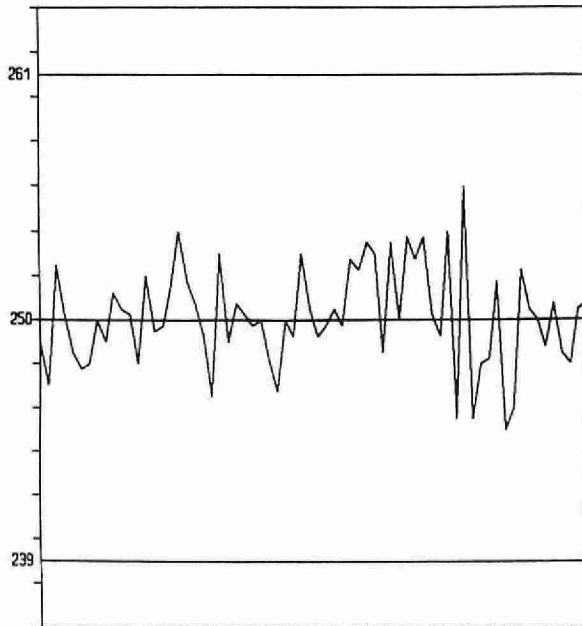
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	68	0.007	0.038

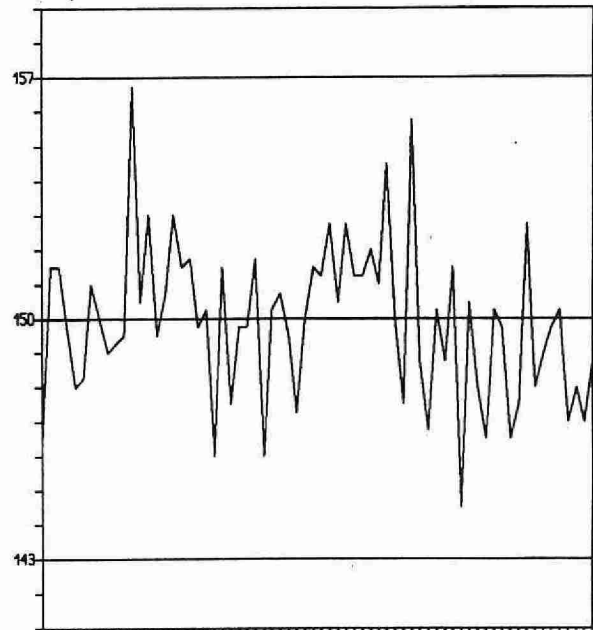
SULPHATE (ug/filter as SO₄)

(SSO₄NF)

QUALITY CONTROL DATA FROM 10/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: PRIC1	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards.

Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Two analytical ranges are in operation at this work station, and subsequently, quality control results are provided for each range.

SULPHATE

QUALITY CONTROL DATA FROM 28/01/91 TO 18/12/91

Lab: Ion Chromatography

Analytical Range: - to 5.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	40	4.0	4.017	0.017	0.0395
B :	40	1.0	1.005	0.005	0.0211
A+B :	40	5.0	5.022	0.022	0.0434
A-B :	40	3.0	3.016	0.016	0.0461

s.d.(AB) S(between runs): 0.03 Sw(within run): 0.03 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.77 - 5.23 for A+B
2.84 - 3.16 for A-B

DUPLICATES:

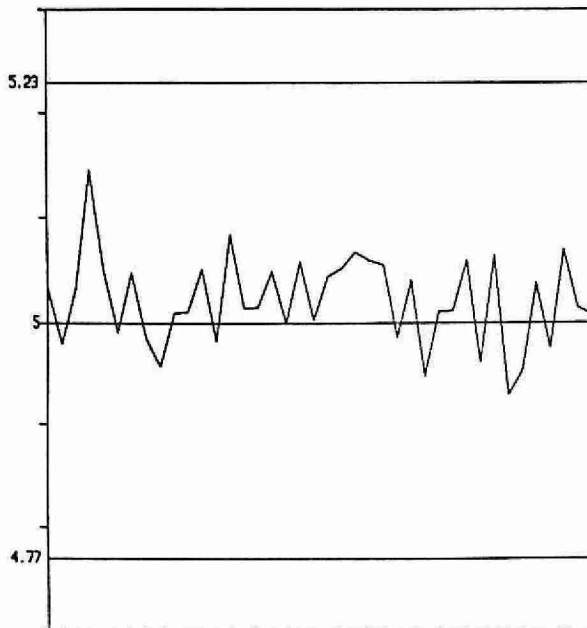
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
14	0.0 - 0.5	0.016	7.0
44	0.5 - 2.0	0.030	2.7
54	2.0 - 5.0	0.058	2.6
112	Overall	0.038	

OTHER CHECKS:

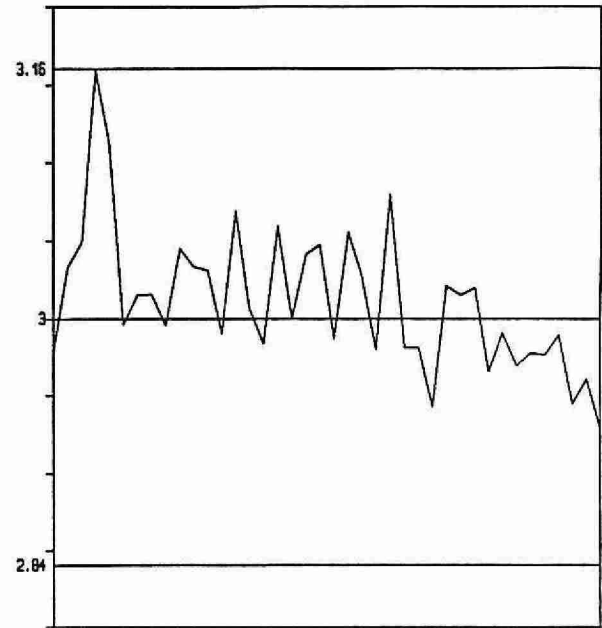
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	40	0.035	0.027

SULPHATE (mg/L as SO₄)

QUALITY CONTROL DATA FROM 28/01/91 TO 18/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

SULPHATE

QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91

Lab: Ion Chromatography

Analytical Range: - to 10.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	77	8.0	8.019	0.019	0.0672
B :	77	2.0	1.997	-0.003	0.0402
A+B :	77	10.0	10.015	0.015	0.0898
A-B :	77	6.0	6.022	0.022	0.0647

s.d.(AB) S(between runs): 0.055 Sw(within run): 0.045 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.4 - 10.6 for A+B
5.6 - 6.4 for A-B

DUPLICATES:

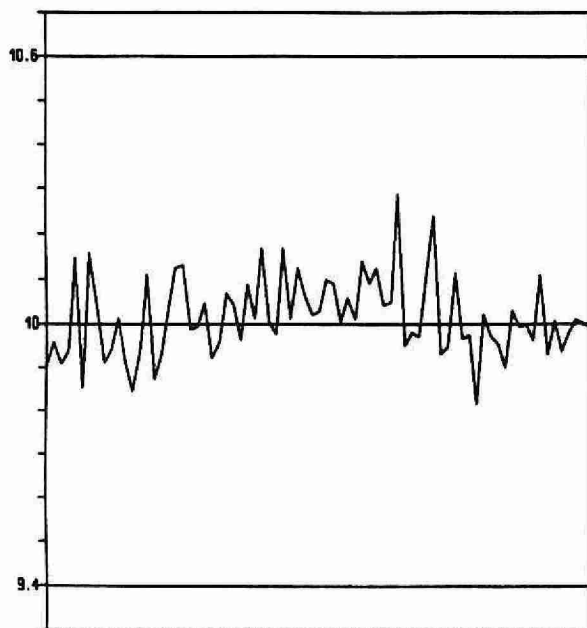
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
22	0.0	-	1.0	0.052	2.1
67	1.0	-	5.0	0.101	1.9
88	5.0	-	10.0	0.131	1.7
177	Overall			0.109	

OTHER CHECKS:

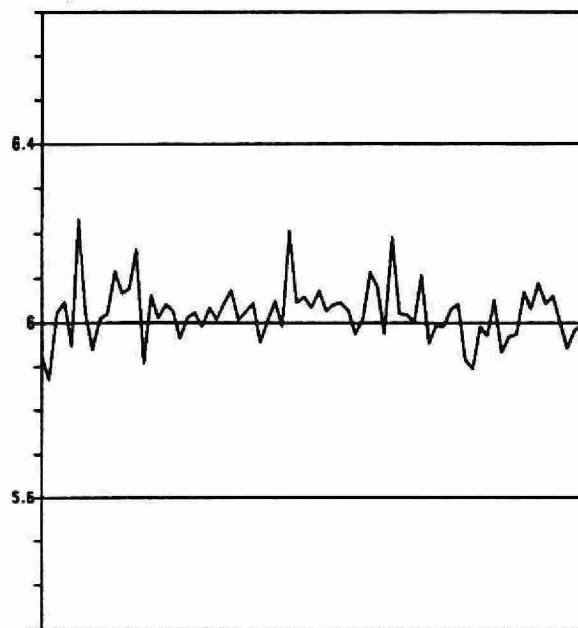
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	77	0.0219	0.0340

SULPHATE (mg/L as SO₄)

QUALITY CONTROL DATA FROM 08/01/91 TO 18/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: ug/Filter as SO ₄
Work Station Code	: PRLOV	Unit Code	: 361941
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as SO₄. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE

QUALITY CONTROL DATA FROM 21/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 500 µg/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	40	400	400.6	0.6	4.586
B :	40	100	101.2	1.2	2.126
A+B :	40	500	501.8	1.8	4.835
A-B :	40	300	299.4	-0.6	5.265

s.d.(AB) S(between runs): 3.57 Sw(within run): 3.72 S/Sw: 0.96

On any given day the calibration is accepted if the values obtained lie within the ranges:

478 - 522 for A+B
285 - 315 for A-B

DUPLICATES:

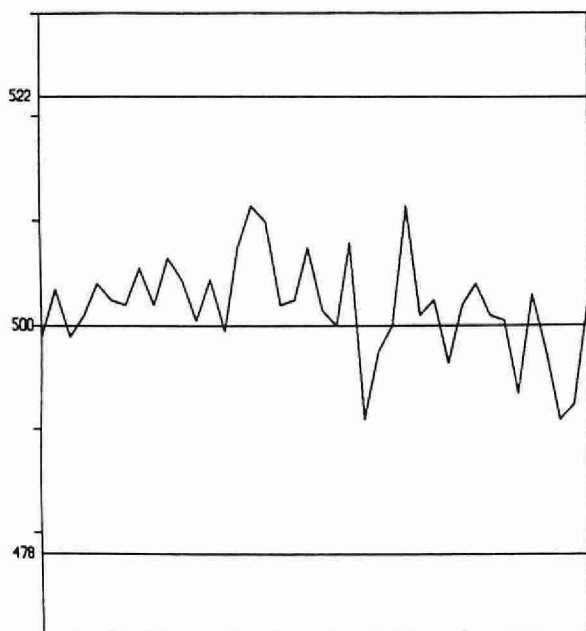
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
22	0	-	100	1.29	40.6
26	100	-	250	2.18	24.3
20	250	-	500	2.42	19.6
68	Overall			1.94	

OTHER CHECKS:

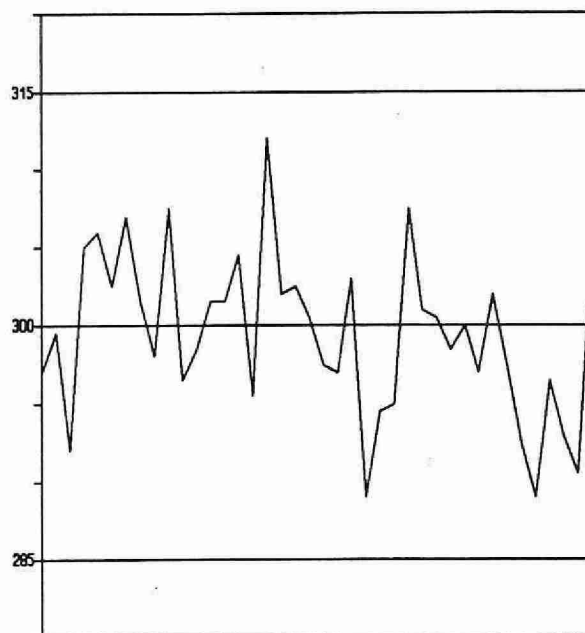
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	40	0.006	0.026

SULPHATE (ug/filter as SO₄)

QUALITY CONTROL DATA FROM 21/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/82
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: RMDSO4	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3172A		
Sample Type/Matrix	: Rivers, Lakes, Domestic Waters, Leachates, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic bottle

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the samples by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO₄ is determined by comparison of the sample scan to a series of standard scans.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

SULPHATE

QUALITY CONTROL DATA FROM 03/01/91 TO 23/12/91

Lab: Ion Chromatography

Analytical Range: - to 100.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	120	80.0	80.349	0.349	0.7084
B :	120	20.0	20.005	0.005	0.3943
A+B :	120	100.0	100.363	0.363	0.8776
A-B :	120	60.0	60.353	0.353	0.7360

s.d.(AB) S(between runs): 0.57 Sw(within run): 0.52 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.4 - 103.6 for A+B
57.6 - 62.4 for A-B

DUPLICATES:

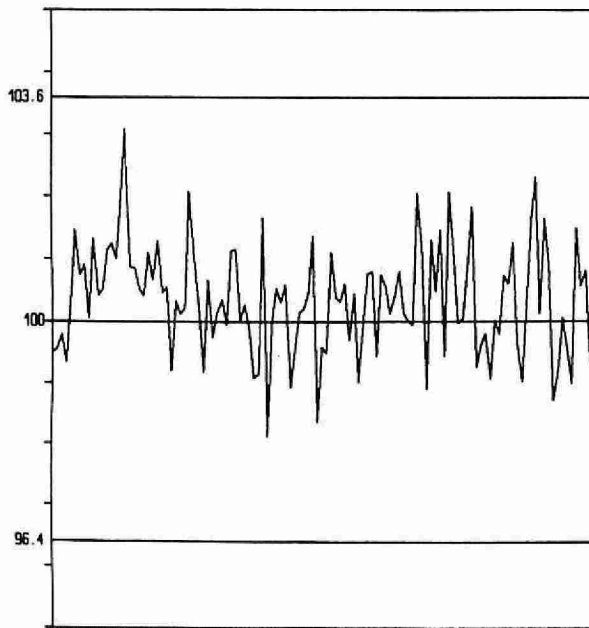
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
121	0.0	-	20.0	0.213	2.7
143	20.0	-	50.0	0.560	2.6
45	50.0	-	100.0	1.354	3.4
309	Overall			0.492	

OTHER CHECKS:

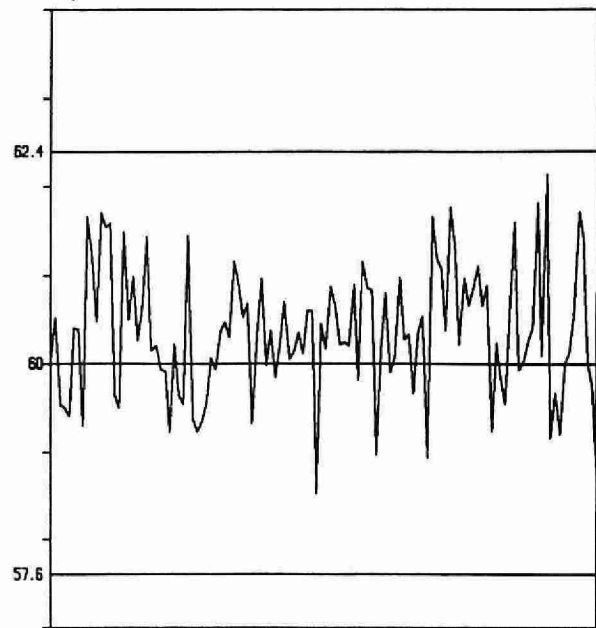
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	116	0.512	0.122

SULPHATE (mg/L as SO₄)

QUALITY CONTROL DATA FROM 03/01/91 TO 23/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SULPHATE, ADSORBED ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	:
LIS Test Name Code	: SSO4AD	Units	: ug/g as SO ₄ ⁼
Work Station Code	: DOPES	Unit Code	: 073941
Method Code	: 304A15	Supervisor	: A. Neary
Method Reference No.	: E3044A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 10 g air dried and sieved to < 2mm.
Container : glass or plastic

SAMPLE PREPARATION:

Samples are air dried and sieved to < 2mm.

ANALYTICAL PROCEDURE:

Samples are weighed into centrifuge tubes and shaken with 25 ml NaH₂PO₄ solution containing 1000 mg/l P solution for 1 hour. Samples are centrifuged and filtered. The filtrate is analyzed by ion chromatography. Adsorbed plus soluble SO₄ is measured.

INSTRUMENTATION:

Ion chromatography system consisting of spectroflow 400 pump, Waters model 430 conductivity detector, spectrophysics SP8780XR autosampler and Technical Marketing Associates chart recorder. A Wescan anion column is used for the separation.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

7 standards covering the range 0 - 100 ug/g as SO₄⁼

CONTROLS:

Calibration : 3 long term soil samples representing different soil types, and 2 method blanks

SULPHATE, ADSORBED

QUALITY CONTROL DATA FROM 09/01/91 TO 31/01/91

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Conc Measured	Standard(1) Deviation
R1 :	4	10.775	2.417
R2 :	4	34.950	1.034
R3 :	4	50.750	3.264

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.0 - 20.0	N.A.	N.A.
6	20.0 - 50.0	1.30	2.8
3	50.0 - 100.0	2.02	2.8
10	Overall	1.53	

OTHER CHECKS:

	Number of Data	Av. Conc Measured	Standard(1) Deviation
Digested blank	4	0.325	0.377

*** SULPHATE, ORGANO-SULPHUR ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/03/90
LIS Test Name Code	: SSO4UV	Units	: mg/L as SO ₄
Work Station Code	: ORGSO4	Unit Code	: 064941
Method Code	: 005IC1	Supervisor	: F. Lo
Method Reference No.	: E3299A		
Sample Type/Matrix	: Rivers,Precipitation,Soil Extracts		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The aqueous samples are mixed with a dilute solution of hydrogen peroxide and subsequently exposed to ultra-violet light radiation in a continuous flow system. The organo-sulphur compounds are oxidized to sulphate. The resultant sulphate, plus any sulphate originally present in the sample is separated from other anions in the samples by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO₄ is determined by comparison of the sample scan to a series of standard scans.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

SULPHATE, ORGANO-SULPHUR

QUALITY CONTROL DATA FROM 07/01/91 TO 12/12/91

Lab: Ion Chromatography

Analytical Range: - to 20 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	20	8.0	7.956	-0.044	0.114
B :	20	2.0	2.0005	0.0005	0.048
A+B :	20	10.0	9.957	-0.043	0.147
A-B :	20	6.0	5.956	-0.044	0.095

s.d.(AB) S(between runs): 0.09 Sw(within run): 0.07 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55 - 10.45 for A+B
5.70 - 6.30 for A-B

DUPLICATES:

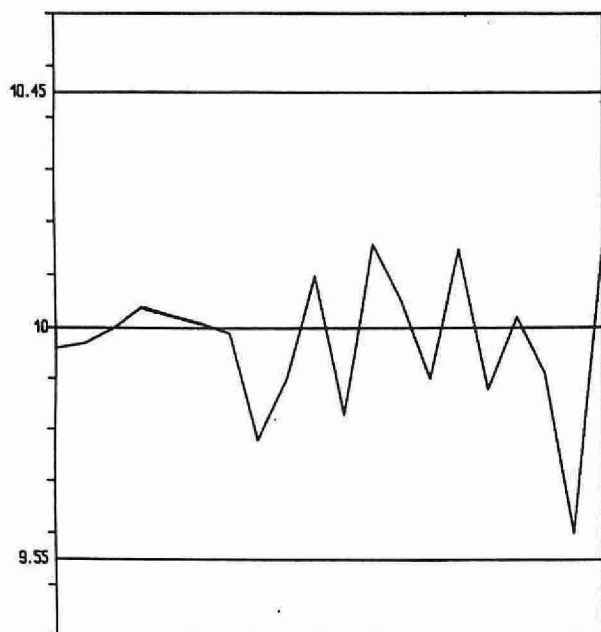
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
11	0.0	-	5.0	0.075	2.5
21	5.0	-	10.0	0.154	0.5
0	10.0	-	20.0	N.A.	N.A.
32	overall			0.129	

OTHER CHECKS:

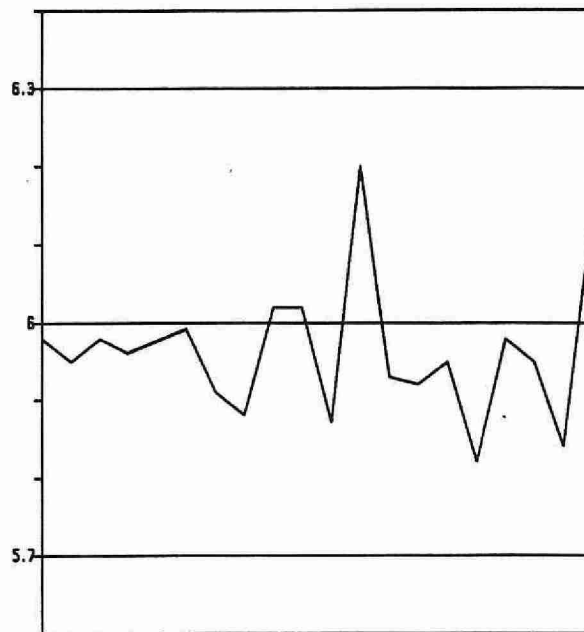
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	46	<0.05	0.00

SULPHATE, ORGANO-SULPHUR (mg/L as SO₄)

QUALITY CONTROL DATA FROM 07/01/91 TO 12/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHATE, WATER EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SSO4EW	Units	: ug/g as SO ₄
Work Station Code	: DOANIONX	Unit Code	: 073941
Method Code	: 301AI5	Supervisor	: A. Neary
Method Reference No.	: E3021A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 10 g air dried
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Five grams of sample is agitated for 60 minutes with 25 mL deionized water. Samples are centrifuged at 10,000 rpm and the supernatant is filtered through a 0.45 um membrane filter. Sulphate is determined on the filtrate by ion chromatography.

INSTRUMENTATION:

- Waters Model 430 Conductivity Detector
- Spectroflow 400 solvent delivery system
- Spectro-Physics SP780 XR autosampler
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 6 standards; 2 QC solutions at 25% and 75% of full scale.

CONTROLS:

Calibration : 2 method BL plus 2 standards, e.g. QCA
Recovery : 2 long term soil samples representing different soil types
Drift : 100% full scale standard every 10 samples

SULPHATE, WATER EXTRACTABLE

QUALITY CONTROL DATA FROM 06/12/91 TO 08/02/91

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	75.00	75.23	0.23	1.365
B :	3	36.00	34.73	-1.27	0.586
A+B :	3	111.00	109.97	-1.03	1.935
A-B :	3	39.00	40.50	1.50	0.819

s.d.(AB) S(between runs): 1.05 Sw(within run): 0.58 S/Sw: 1.81

On any given day the calibration is accepted if the values obtained lie within the ranges:

103.5	-	118.5	for	A+B
34.0	-	44.0	for	A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	12.73	0.987
R2 :	3	50.83	1.665
R3 :	3	3.1	0.1

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.0 - 20.0	0.3	7.697
1	20.0 - 50.0	N.A.	N.A.
0	50.0 - 100.0	N.A.	N.A.
9	Overall	0.369	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	3	0.167	0.2887

***** SULPHUR DIOXIDE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO2FR	Units	: ug/Filter as SO ₂
Work Station Code	: PRSEQ	Unit Code	: 361943
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: W41 filters from LoVol and sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube
Other	: Filter is impregnated with potassium carbonate/glycerol solution.

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of 0.05% H₂O₂ in polypropylene tubes with one hour of mechanical shaking, followed by ultrasonic treatment to enhance extraction, then a 24 hour rest period. SO₂ is converted to SO₄ in the process.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the extract by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to ug/filter as SO₂. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Mechanical shaker; ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus ,2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHUR DIOXIDE

QUALITY CONTROL DATA FROM 03/01/91 TO 20/12/91

Lab: Ion Chromatography

Analytical Range: - to 350 ug/filter as SO₂

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	70	266.0	264.01	-1.99	2.43
B :	70	67.0	66.15	0.15	1.62
A+B :	70	333.0	330.16	-2.84	2.90
A-B :	70	200.0	197.86	-2.14	2.94

s.d.(AB) S(between runs): 2.06 Sw(within run): 2.08 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

321	-	345	for	A+B
191	-	209	for	A-B

DUPLICATES:

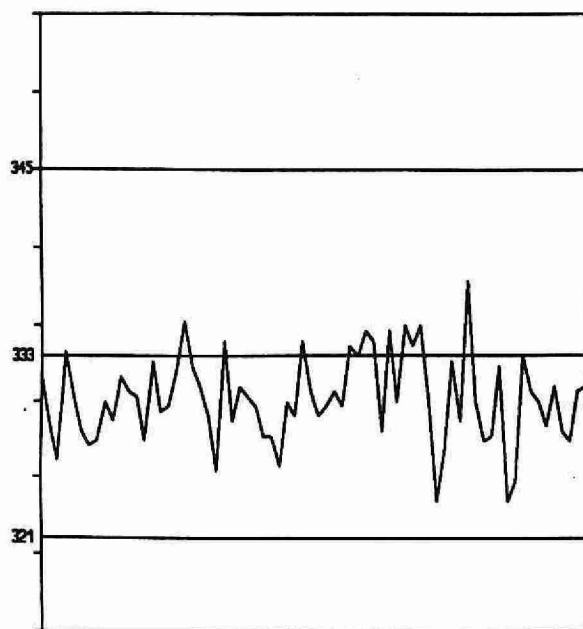
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
62	0	-	35	0.423	6.9
24	35	-	70	1.377	2.8
27	70	-	175	2.255	2.6
16	175	-	350	4.301	1.6
129	Overall			1.189	

OTHER CHECKS:

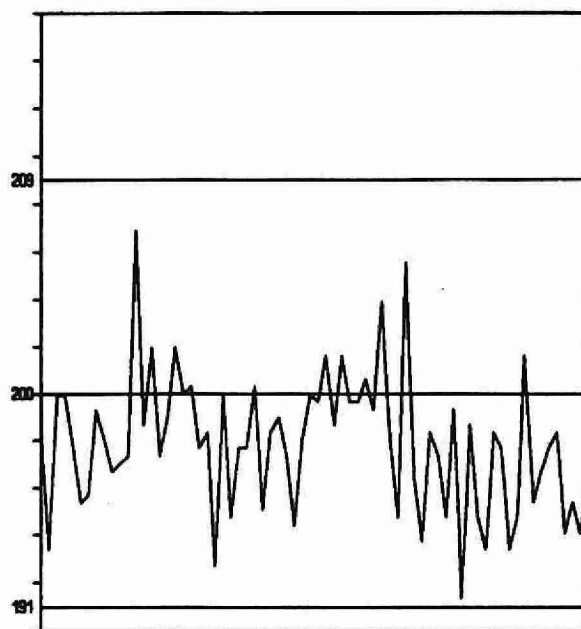
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	70	0.007	0.038

SULPHUR DIOXIDE (ug/filter as SO₂)

QUALITY CONTROL DATA FROM 03/1/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** TURBIDITY *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
	: Ion Chromatography	Units	: FTU
LIS Test Name Code	: TURB		
Work Station Code	: RMTURB	Unit Code	: 343000
	: WTURB	Supervisor	: M. Rawlings
Method Code	: 002AI1		
Method Reference No.	: E3231A		
Sample Type/Matrix	: Rivers, Lakes, Effluents		
	: Drinking Water, Industrial, Sewage		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with sealed standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration : BL plus two standards, e.g. QCA

NOTES:

Two work stations are used for turbidity analyses: RMTURB and WTURB. Each used a different set of standards for calibration control. Laboratory, Work Station Code, Sample Type/Matrix, are given in their respective orders.

The constant drift readily noticeable in the calibration control standards is due to slow degeneration of the semi-solid matrix (Gelex) standards themselves. However, there is no better long term calibration material available. Periodic checks against freshly prepared Formazin standard is used to confirm the drift.

TURBIDITY

QUALITY CONTROL DATA FROM 09/01/91 TO 20/12/91

Lab: Colourimetry

Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	175	15.7	15.39	-0.31	0.4006
B :	175	1.7	1.76	0.06	0.0760
A+B :	175	17.4	17.15	-0.25	0.4184
A-B :	175	14.0	13.63	-0.07	0.3969

s.d.(AB) S(between runs): 0.29 Sw(within run): 0.28 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

16.2	-	18.6	for A+B
13.2	-	14.8	for A-B

DUPLICATES:

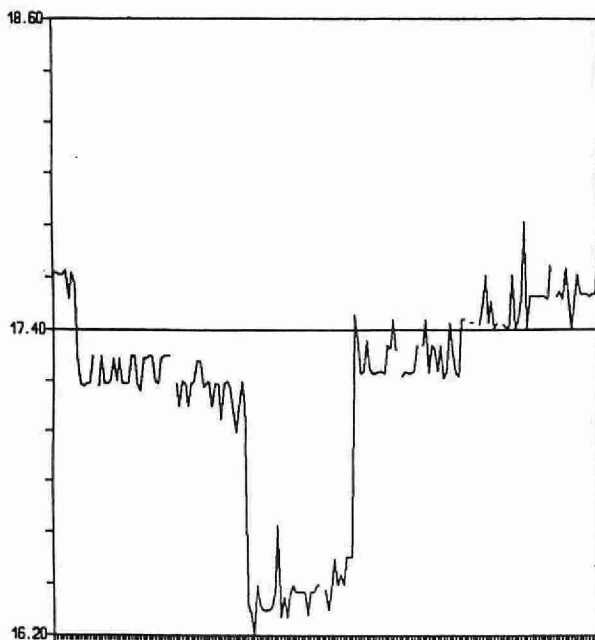
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
26	0.0	-	1.0	0.0676	18.4
90	1.0	-	2.0	0.1114	8.0
224	2.0	-	10.0	0.2413	6.7
75	10.0	-	20.0	0.5379	4.9
56	20.0	-	50.0	1.2848	4.1
41	50.0	-	200.0	2.1242	4.5
512	Overall			0.3900	

OTHER CHECKS:

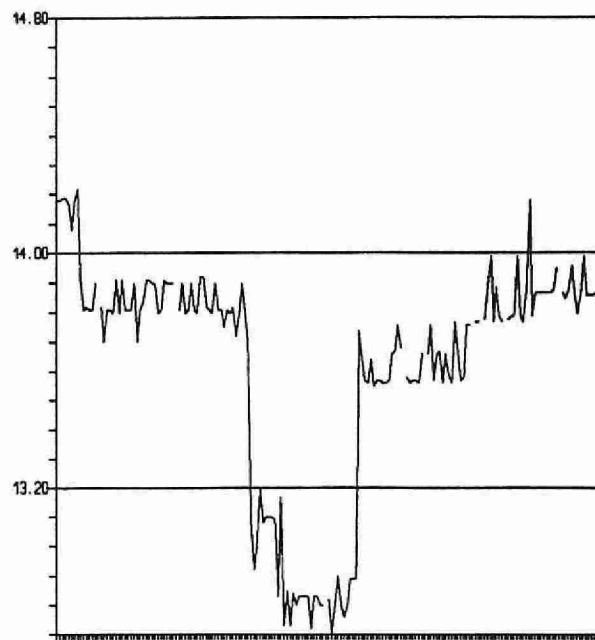
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	177	0.083	0.448

TURBIDITY (FTU)

QUALITY CONTROL DATA FROM 09/01/91 TO 20/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

TURBIDITY

QUALITY CONTROL DATA FROM 08/01/91 TO 23/12/91

Lab: Titration

Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	266	18.26	18.264	-0.004	0.2271
B :	266	1.8	1.742	0.058	0.0381
A+B :	266	19.8	20.006	-0.206	0.2432
A-B :	266	16.2	16.522	-0.322	0.2166

s.d.(AB) S(between runs): 0.16 Sw(within run): 0.15 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

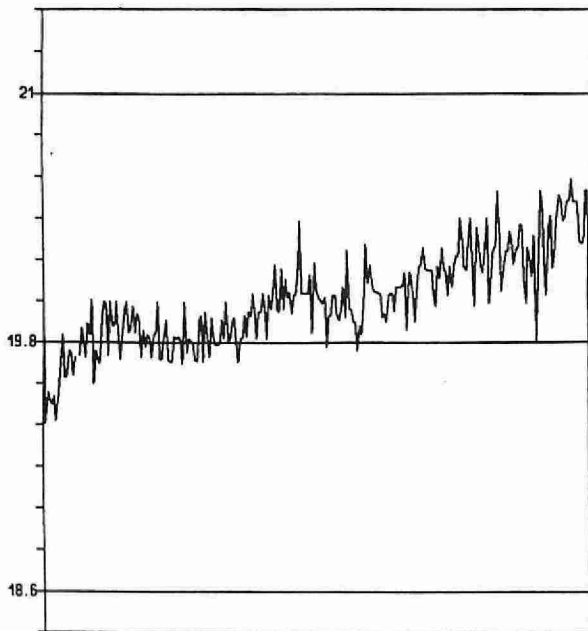
18.6 - 21.0 for A+B
15.4 - 17.0 for A-B

DUPLICATES:

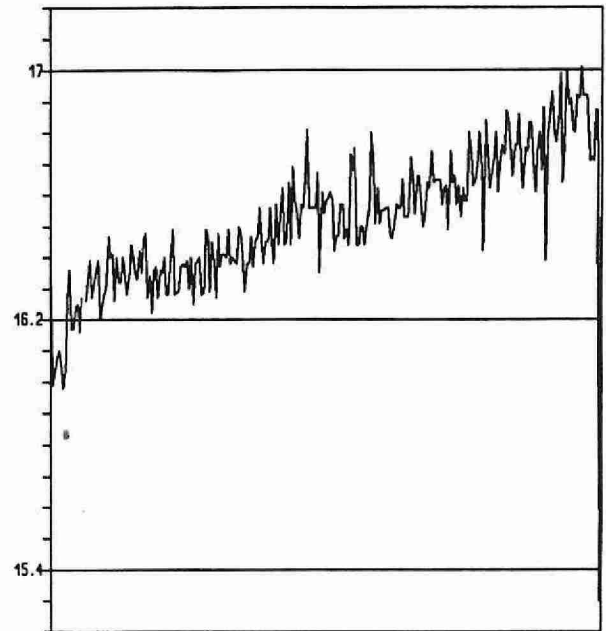
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
382	0.0 - 1.0	0.0272	10.0
88	1.0 - 2.0	0.0564	7.0
113	2.0 - 10.0	0.2492	5.7
33	10.0 - 50.0	0.7405	5.1
16	50.0 - 200.0	2.4352	1.8
632	Overall	0.0655	

TURBIDITY (FTU)

QUALITY CONTROL DATA FROM 08/01/91 TO 23/12/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** ZINC, ACID EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ZNUT	Units	: ug/g as Zn
Work Station Code	: DOHMT	Unit Code	: 073830
Method Code	: 551AA1	Supervisor	: A. Neary
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated, and sieved to < 2 mm. A subsample is ground to < 500 um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, mixed using a Vortex mixer and allowed to settle and decanted. The supernatant is analyzed for Zn by AAS at 217.0 nm using an air - acetylene flame. Approximate absorbance: 0.3 at the full scale value. Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types, 2 method blanks, and one judiciously blended sample digest run with each run.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

ZINC, ACID EXTRACTABLE

QUALITY CONTROL DATA FROM 21/02/91 TO 23/02/91

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	3	79.0	80.07	1.07	2.290
B :	3	30.0	32.60	2.60	0.361
A+B :	3	109.0	112.67	3.67	2.146
A-B :	3	49.0	47.47	-1.53	2.479

s.d.(AB) S(between runs): 1.64 Sw(within run): 1.75 S/Sw: 0.94

On any given day the calibration is accepted if the values obtained lie within the ranges:

101.5 - 116.5 for A+B
44.0 - 54.0 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	35.67	2.854
R2 :	3	78.57	0.586
R3 :	3	39.93	1.419

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.0 - 20.0	N.A.	N.A.
9	20.0 - 50.0	1.919	5.2
0	50.0 - 100.0	N.A.	N.A.
9	Overall	1.919	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	3	0.07	0.115

*** ZINC, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: ZINC	Units	: ug/L
Work Station Code	: DOTRACE	Unit Code	: 063830
Method Code	: 005AF2	Supervisor	: A. Neary
Method Reference No.	: E3304A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required	: 5mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO ₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 213.9 nm.
Absorbance : 0.8 at full scale

INSTRUMENTATION:

Varian graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.001	T value: 0.005
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CALIBRATION:

Blank plus 5 calibration standards.

CONTROLS:

Calibration	: 1 NRC solution, 3 duplicates
Drift	: 1 standard every 10 samples

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

ZINC, TOTAL

QUALITY CONTROL DATA FROM 03/01/91 TO 17/08/91

Lab: Dorset

Analytical Range: - to 15.00 ug/L as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	43	8.00	9.75	1.25	1.18
B :	43	2.00	2.34	0.34	0.50
A+B :	43	10.00	12.09	2.09	1.48
A-B :	43	6.00	7.40	1.40	1.05

s.d.(AB) S(between runs): 0.91 Sw(within run): 0.74 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.50 - 14.50 for A+B
3.00 - 9.00 for A-B

DUPLICATES:

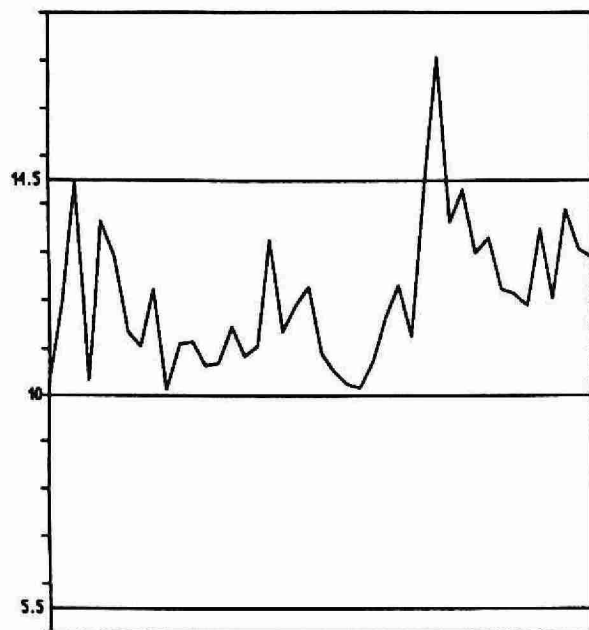
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.0 - 5.0	1.109	32.2
4	5.0 - 10.0	2.181	2.3
7	10.0 - 15.0	2.395	2.5
19	Overall	2.181	

OTHER CHECKS:

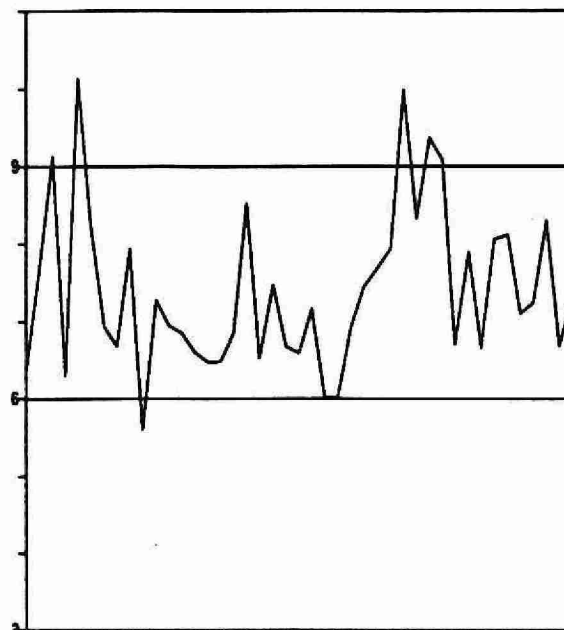
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	43	0.039	0.127

ZINC, TOTAL (ug/L as Zn)

QUALITY CONTROL DATA FROM 03/01/91 TO 17/08/91



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

ZINC, TOTAL

QUALITY CONTROL DATA FROM 21/08/91 TO 03/12/91

Lab: Dorset Soils

QUALITY CONTROL:

	Number of Data	Av. Conc Measured	Standard(1) Deviation
NRC :	11	3.237	0.0355

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
33	0.00 - 5.00	0.096	6.7
2	5.00 - 15.00	N.A	N.A
4	15.00 - 20.00	2.117	8.8
39	Overall	0.141	

NOTES:

A new series of low level calibration control standards from EPA ampoules is currently in place and the data are currently being collected. Thus, only data from NRC analysis are provided for this report.

PART 3.0

MICROBIOLOGY

3.1 Quality Control Program, Microbiology

Sources of error in a microbiological lab often are attributed to lack of implementation of quality control procedures for media preparation and storage, equipment malfunction, inadequate cleaning or sterilization of glassware and impure water supplies. Detailed information regarding the quality control program for these issues are discussed in the LSB publications (8)(9). This report discusses only the quality control procedures that are related directly to sample analysis.

Analyses on microbiological samples for bacteria indicative of pollution require the careful use of methods and techniques by technicians to prevent contamination which will produce either false positive or false negative results. Checks are made to ensure that the analytical procedures are functioning properly and providing the client with results that are both accurate and reproducible within the limits of normal statistical variation. To this end, a series of quality control tests are conducted on a regular basis and their results are monitored so that any irregularities in the test procedures are corrected and false results are not reported.

Membrane Filtration Test (MF)

Blank Control Filters

Each sample analyzed by the membrane filter test is separated from the previous sample by introducing a control filter at the beginning of each analysis. The control filter is employed in the same manner as those filters used for sample analyses, however, only sterile buffered rinse water is filtered. The control filter is placed on the same bacterial medium as used for incubation of filters from the actual sample, so that all filters are incubated under the same conditions. If any bacteria appear on the control filter, they were likely carried over from the previous sample. No target or indicator organisms and <10 non-target or background organisms should appear on the control filter. If these limits are exceeded, the senior technician/supervisor is consulted. If excessive contamination is suspected the result will not be reported and, if possible, the analyses will be repeated.

Duplicate Analyses

Duplicate analyses are conducted at a frequency of one in twenty samples. The data are accumulated for each parameter and a within-run standard deviation is calculated to give a measure of the repeatability of results. The calculation of the standard deviation is the same as that used in section 2.1 under sample repeatability. A control limit is established based on historical data whereby, the observed differences in duplicate results are sorted according to ranges of colony counts per filter. At present three ranges are used: 0 - 30, 31 - 75, and 76 - 150 colonies per filter. The mean difference within each range is multiplied by 3.267 (3). If the control limit is exceeded the senior technician/supervisor is consulted. If excessive bias is suspected, the results will not be reported.

Media Quality Control

A number of checks are made both during and after the preparation of a batch of medium. The pH of a medium is monitored after all the ingredients have been added and again after sterilization has taken place. The final pH may vary within ± 0.2 units from the recommended value. The medium is checked for sterility at both 20°C and 35°C by incubating random samples of either tubes or plates depending on how the medium is dispensed. Any bacterial growth will require re-testing of the medium for sterility. Confirmation of contamination will result in the rejection of the medium for any further use. The batch or lot number of a medium is recorded to determine if any changes in quality occur when batch or lot numbers change.

Differential agar media used in the detection and enumeration of indicator bacteria are tested to ensure their proper functioning. The medium is streaked with both a known target organism or positive culture and a known non-target organism or negative culture. If the medium is functioning properly, growth of the target organism will be abundant after 24 to 48 hours and growth of the non-target organism will not occur or will be minimal even after 72 hours of incubation. The results of all such tests are recorded and any deviations from the expected results will require re-testing or rejection of the medium.

A quantitative QC test of agar media for membrane filter tests involves making up dilute suspensions of the positive and negative cultures. Selected dilutions of these suspensions are passed through membrane filters, which are then placed on plates of both the inhibitory or selective medium and plates of a non-inhibitory or non-selective medium, such as Brain Heart Infusion agar. The positive culture should form approximately the same number of colonies on the selective and non-selective media plates, whereas the negative culture should only form colonies on the non-selective medium. This procedure is conducted on one out of ten media batches. Alternatively, one or more samples containing target organisms are filtered in duplicate and respective filters are placed on agar plates from the new and previous batch of medium. Results are recorded and statistically analyzed using duplicate analyses format. Failure to meet the past performance of the previous medium is proceeded with action to re-test and reject.

Presence-Absence (P-A) Tests

Blank Control P-A Bottles

For each group of 21 samples, a blank control is prepared by pouring a 99 mL dilution blank into a P-A bottle and incubating it along with the regular P-A bottles. The P-A blank bottle is incubated for three to four days and should remain free of any bacterial growth or colour change. Growth in more than one P-A blank control test will require rechecking of the sterility of the dilution blanks and P-A medium.

Media Quality Control

A number of checks are performed on the P-A broth including: pH, sterility at 20°C and 35°C, and growth reaction of Escherichia coli. If the medium is functioning properly, E. coli will produce a strong acid reaction (yellow colour in the medium) and agitation of the bottle will cause release of the dissolved gas in the medium producing a layer of foam at its surface.

In addition, a quantitative test of the P-A broth is done by pipetting 2 mL of broth onto a filter pad and filtering a suspension of E. coli through a membrane filter, which is then placed on the filter pad saturated with the P-A broth. A second MF is prepared with a similar volume of an E. coli suspension and placed on Brain Heart Infusion agar in a petri dish. Previous testing has shown that E. coli colony counts on both filters should be approximately the same. Quality Control checks on EC broth, Lactose Purple broth, MacConkey agar, Nutrient Gelatin Yeast Extract agar and Mannitol Salt agar include pH readings, sterility and bacterial growth reactions of positive and negative cultures inoculated onto or into each medium. If any Quality Control tests fail, the medium is either re-tested or rejected.

Sample Age

The accurate determination of bacterial numbers for indicator or heterotrophic bacteria in a sample depends on how quickly the sample can be transported to the laboratory for analysis. Water samples should be kept as close to the original water temperature by using a foam-pack container, which includes a central plastic bottle containing water that has been frozen, or by cooling to refrigeration temperatures before shipment to the laboratory. (10)

Samples should arrive at the laboratory on the same day as sampled or, if refrigerated, within 24 hours. For sewage effluent and surface water samples, no analysis will be done if the samples are older than 48 hours; for drinking water samples, the time limit is 72 hours, and for legal samples, it is 24 hours. Limits on the age of samples for analysis must be in place as bacterial numbers in samples may increase or decrease depending on nutrients, toxic elements and the influence of temperature on the metabolic activities of the organisms. The longer the time period between sampling and analysis, the greater the chance for producing either inflated or deflated numbers of organisms per 100 mL of sample.

3.2 PERFORMANCE SUMMARIES MICROBIOLOGY

***** ESCHERICHIA COLI *****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: 1979
		Units	: Counts/100mL
LIS Test Name Code	: ECMF	Unit Code	: 301532
Work Station Code	: MSBACIND	Supervisor	: J. Clark
Method Code	: TFC 24		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hour at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. After incubation the membrane filter is transferred to a pad soaked in urease reagent and is given a reaction time of 15 minutes. All colonies that were yellow on mTEC agar and remain yellow on urease are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

ESCHERICHIA COLI

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
74	0 - 30	3.0	2.8	18.5
24	31 - 75	5.6	4.9	8.7
16	76 - 150	8.5	7.6	6.7

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A.	N.A.	N.A.

MEDIUM QC: mTEC agar (previous batch) vs mTEC agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
14	0 - 30	2.5	2.4	16
33	31 - 75	6.1	5.4	10
11	76 - 150	5.9	5.2	5

***** FECAL COLIFORMS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1979
	: Municipal Drinking Water	Units	: Counts/100mL
		Unit Code	: 301532
		Supervisor	: J. Clark
LIS Test Name Code	: FCMF		
Work Station Code	: MSBACIND		
	: WQMFPFA		
Method Code	: TF1 24		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Surface, Waste and Drinking Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

FECAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
238	0 - 30	2.7	2.4	16
65	31 - 75	6.8	5.8	11
54	76 - 150	7.4	6.4	6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
6162	21	0.34

MEDIUM QC: mTEC agar (previous batch) vs m TEC agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
14	0 - 30	2.5	2.4	16
33	31 - 75	6.1	5.4	10
11	76 - 150	5.9	5.2	5

FECAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
103	0 - 30	2.3	2.1	14.3
20	31 - 75	4.7	3.9	7.3
3	76 - 150	14.3	10.1	9

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A.	N.A.	N.A.

MEDIUM QC: mTEC agar (Selective) vs Brain Heart Infusion agar (Non- selective)
Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
3	0 - 30	4.3	4.3	28
4	31 - 75	5.5	5.1	10
3	76 - 150	15	11.8	10

***** FECAL STREPTOCOCCUS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: Apr. 1972
LIS Test Name Code	: FSMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: EF 48	Supervisor	: J. Clark
Method Reference No.	: E3110A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 ml glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mEnterococcus agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies that are red, maroon or pink are counted as fecal streptococcus. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs non selective medium
	: Comparison of target counts on an old vs a new batch.

FECAL STREPTOCOCCUS

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
220	0 - 30	2.5	2.4	16
88	31 - 75	5.4	4.7	9
18	76 - 150	7.7	6.4	6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A.	N.A.	N.A.

MEDIUM QC: mEnterococcus agar (previous batch) vs m Enterococcus agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
14	0 - 30	3.1	3.0	20
19	31 - 75	4.6	4.2	8
3	76 - 150	5.0	4.2	4

***** HETEROTROPHS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1, 1979
	: Municipal Drinking Water	Units	: Counts/mL
		Unit Code	: 301532
		Supervisor	: J. Clark
LIS Test Name Code	: HB35MF		
Work Station Code	: MSBACIND		
	: WQMFP		
Method Code	: SF 48		
Method Reference No.	: E3110A		
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mHPC agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies are counted as heterotrophs. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Comparison of colony counts on an old vs a new batch are done using water samples.

HETEROTROPHS

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
83	0 - 30	2.3	2.1	14
3	31 - 75	6.3	5.6	11
4	76 - 150	8.5	8.2	7

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
1399	223	15.9

MEDIUM QC: mHPC agar (previous batch) vs mHPC agar (new batch) - inoculated with pure culture - *A. calcoaceticus*.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
24	0 - 30	2.5	2.4	16
12	31 - 75	4.7	4.2	8
7	76 - 150	12.7	10.9	10

HETEROTROPHS

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
123	0 - 30	2.2	2.1	14
11	31 - 75	9.3	8.2	15
11	76 - 150	10.5	9.0	8

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
1522	335	22

MEDIUM QC: mHPC agar (previous batch) vs mHPC agar (new batch) - inoculated with pure culture - A. calcoaceticus.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
24	0 - 30	2.5	2.4	16
12	31 - 75	4.7	4.2	8
7	76 - 150	12.7	10.9	10

***** PRESENCE-ABSENCE (P-A) TEST *****

IDENTIFICATION:

Laboratory	: Municipal Drinking Water	Method Introduced	: 1968
		Units	: Present/Absent/100mL
LIS Test Name Code	: PABOT	Unit Code	: 999000
Work Station Code	: WQMFPFA	Supervisor	: J. Clark
Method Code	: LLSB10		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

A 100 mL volume of sample is added to a presence-absence (P-A) bottle. The bottle is incubated at 35°C for 3 to 4 days and examined every 24 hours for acid or acid and gas formation. When a positive reaction for acid or acid and gas occurs, inoculum is transferred to confirmatory media to determine the presence of total coliforms, fecal coliforms and other indicator organisms.

REPORTING:

Microbiological parameters are reported either as present or absent per 100 mL of sample.

CONTROLS:

	: A blank control sample is included for every 20 to 25 samples.
Medium QC	: P-A broth batches are checked for sterility at 20° and 35°C and inoculation of the medium is done with <u>E. coli</u> to determine its response. Dilutions of <u>E. coli</u> are passed through membrane filters which are subsequently placed on filter pads saturated with P-A broth and on an enrichment medium, such as Brain Heart Infusion Agar, to compare numbers of colonies recovered.

PRESENCE-ABSENCE (P-A) TEST

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Municipal Drinking Water

CONTROL FILTERS:

Number of samples	Number of controls	Number of positive controls	Percent positive controls
-----	-----	-----	-----
22572	1105	6	0.54

MEDIUM QC: P-A Broth (Selective) vs Brain Heart Infusion agar (Non - selective)
Test Organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
82	0 - 30	3.0	2.9	20
38	31 - 75	7.0	6.3	12
38	76 - 150	13.3	12.3	11

***** PSEUDOMONAS AERUGINOSA *****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1980
LIS Test Name Code	: PSAMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: PF 48	Supervisor	: J. Clark
Method Reference No.	: E3109A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mPA agar and incubated for 48 +/- 2 hours at 41.5 +/- 0.5°C to allow for colony development. All colonies that are dark brown, brown with darkened centers, tan and usually very flat in appearance are counted as Pseudomonas aeruginosa. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

PSEUDOMONAS AERUGINOSA

QUALITY CONTROL DATA FROM 01/01/91 TO 01/12/91

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
91	0	-	30	1.8	1.7	11.8
17	31	-	75	8.9	6.9	12.2
6	76	-	150	7.5	6.4	5.6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
N.A.	N.A.	N.A.

MEDIUM QC: mPA agar (previous batch) vs mPA agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
6	0	-	30	3.2	3.1	21
0	31	-	75	N.A.	N.A.	N.A.
0	76	-	150	N.A.	N.A.	N.A.

***** TOTAL COLIFORMS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: Jan. 1971
	: Municipal Drinking Water		
LIS Test Name Code	: TCMF	Units	: Counts/100ml.
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFPFA		
Method Code	: LF 22	Supervisor	: J. Clark
Method Reference No.	: E3106A		
Sample Type/Matrix	: Surface Water, Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mENDO LES agar and incubated for 22 +/- 2 hours at 35 +/- 0.5°C to allow for colony development. All colonies with a dull to bright metallic green-gold sheen are counted as coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

TOTAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
62	0 - 30	2.3	2.2	14
13	31 - 75	8.2	6.8	13
7	76 - 150	4.7	4.2	3.7

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
799	4	0.5

MEDIUM QC: mEndo agar LES (Selective) vs Brain Heart Infusion agar (Non- selective)
Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
33	0 - 30	3.7	3.5	23
20	31 - 75	6.7	5.9	11
16	76 - 150	6.8	6.0	5

TOTAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/91 TO 31/12/91

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
104	0 - 30	2.4	2.4	16
34	31 - 75	3.7	3.3	6.2
3	76 - 150	3.0	2.4	2.1

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
4051	57	1.4

MEDIUM QC: mEndo agar LES (Selective) vs Brain Heart Infusion agar (Non- selective)
Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
33	0 - 30	3.7	3.5	23
20	31 - 75	6.7	5.9	11
16	76 - 150	6.8	6.0	5

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ABBREVIATIONS

AAS	- Atomic Absorption Spectrophotometer
Abs	- Absorbance
APIOS	- Acidic Precipitation in Ontario Study
Av	- Average
Bl	- Blank
C	- Degrees Centigrade
cm	- Centimeter
Concn	- Concentration
Date	- Day/Month/Year
DDW	- Deionized, distilled water
DO	- Dissolved oxygen
DW	- Distilled water
ECSS	- Expert Committee on Soil Survey (Land Resource Research Centre)
EPA	- Environmental Protection Agency
FTU	- Formazin Turbidity Units
g	- Gram
HOAC	- Acetic Acid
HZU	- Hazen Units
IR	- Infra-Red
kg	- Kilogram
L	- Litre
LAB	- Laboratory
LIS	- Laboratory Information System
LTBL	- Long Term Blank
M	- Molar
meq	- Milliequivalent
mg	- Milligram
min	- Minute

ABBREVIATIONS cont'd

mL	- Millilitre
mm	- Millimeter
N.A.	- Not Available or Not Applicable
nm	- Nanometer
QC	- Quality Control
QCA	- Quality Control Standard A
QCB	- Quality Control Standard B
QCC	- Quality Control Standard C
QCD	- Quality Control Standard D
R	- Recovery
rpm	- Revolutions per minute
S	- Between run standard deviation for QC
S ₁	- Standard deviation
S ₂	- Standard deviation for duplicates
S _w	- Within run standard deviation for QC
S. Class	- Weights that have not been certified
s.d.	- Standard deviation
Standard Cal	- Colourimeter setting to control electronic expansion
STD	- Standard
TCU	- True Colour Units
um	- Micrometer
ueq	- Microequivalent
ug	- Microgram
uS	- Micro-Siemen
UV	- Ultra-Violet
V/V	- Concentration based on volume measurements

APPENDIX A

W & T:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (3)(5). The code <W indicates that no measurable response was observed under the test conditions. The reported value indicates the smallest amount that could have been measured under routine conditions. W is smaller than the standard deviation of duplicates near zero. The <T code is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1,2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1991

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Acidity	mg/L CaCO ₃	PHACD	ACDT	100	0.05	0.25
Acidity, Gran	ueq/L H ⁺	PHACD	ACDG	1000	1.0	5.0
Alkalinity,						
Total Fixed Endpoint 4.5.	mg/L CaCO ₃	DOT	ALKT	80	0.05	0.25
	mg/L CaCO ₃	RATS	ALKT	1000	0.2	1.0
	mg/L CaCO ₃	WATS	ALKT	1000	0.2	1.0
	mg/L CaCO ₃	WQSDIRT	ALKT	1000	0.5	2.5
Total Fixed Endpoint 3.8.	mg/L CaCO ₃	DOT	ALKT3	100	0.05	0.25
Alkalinity, Gran	mg/L CaCO ₃	DOT	ALKT1	25		
	mg/L CaCO ₃	RATS	ALKT1	25		
Aluminum,						
Acid Ammonium Oxalate Extractable.	% wt as Al	DOMETOX	ALEOX	2	0.01	0.05
Citrate-Bicarbonate-Dithionite Extractable	% wt as Al	DOMETDI	ALEDI	1	0.01	0.05
Exchangeable Cations	meq/100 g Al	DOCATION	ALESC	2.5	0.01	0.05
Reactive Species	ug/L as Al	DOALSP	ALEXCV	1000	2	10
Reactive Species	ug/L as Al	DOALSP	ALNDCV	1000	2	10
Sodium Pyrophosphate Extractable.	% wt as Al	DOMETALX	ALEPY	0.5	0.01	0.05
Soluble	ug/g as Al	DOSOLAL	ALECA	40	0.2	1
Total	ug/L as Al	DOAAS	ALUT	200	1	5
Cadmium, Total	ug/L as Cd	DOTRACE	CDUT	2	0.001	0.005
Calcium	mg/L as Ca	PRAA400	CAUR	2	0.02	0.1
	mg/L as Ca	PRAAS	CAUR	8	0.02	0.1
	mg/L as Ca	RMAAS	CAUR	40	0.1	0.5
	mg/L as Ca	WAAS	CAUR	200	0.2	1
Exchangeable Cations	meq/100 g Ca	DOCATION	CAESC	5	0.01	0.05
Carbon, Dissolved Inorganic	mg/L as C	DODIC	DIC	10	0.02	0.1
	mg/L as C	ROM	DIC	40	0.2	1
Carbon, Dissolved Organic	mg/L as C	ROM	DOC	20	0.1	0.5
Carbon, Total	% organic C	DOOXMAT	ORGC	40	0.01	0.05
Carbon, Total Organic	mg/L as C	WAC	TOC	50	1	5
Chloride	mg/L as Cl	COCL	CLIDUR	100	0.2	1
	mg/L as Cl	PRIC1	CLIDUR	2	0.01	0.05
	ug/filt Cl	PRLOV	CLIDUR	100	1	5
Clay	% wt as Clay	DOPARTSZ	CLAY	100	1	5
Colour, True	TCU	DOCOL	COLTR	100	1	5
	TCU	WCOL	COLTR	100	0.5	2.5

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1991

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Conductivity	uS/cm	DOCOND	COND25	300	0.2	1
	uS/cm	PRCON	COND25	100	0.2	1
	uS/cm	RATS	COND25	2000	1	5
	uS/cm	WATS	COND25	2000	1	5
	uS/cm	WQSDIRT	COND25	10000	5	25
Copper, Acid Extractable	ug/g as Cu	DOHMT	CUUT	50	0.2	1
Copper, Total	ug/L as Cu	DOTRACE	CUUT	10	0.003	0.015
Fluoride	ug/L as F	DOSPF	FFIDUR	70	0.2	1
	mg/L as F	WFNO3	FFIDUR	2	0.01	0.05
Hardness	mg/L as CaCO ₃	RMAAS	HARDT		0.2	1.0
	mg/L as CaCO ₃	WAAS	HARDT		0.5	2.5
Iron,						
Acid Ammonium Oxalate Extractable	% wt as Fe	DOMETOX	FEEOX	2	0.01	0.05
Citrate-Bicarbonate-Dithionite Extractable	% wt as Fe	DOMETDI	FEEDI	2	0.01	0.05
Sodium Pyrophosphate Extractable	% wt as Fe	DOMETALX	FEEPY	1	0.01	0.05
Iron, Total	ug/L as Fe	DOFEMN	FEUT	1000	2	10
Lead, Acid Extractable	ug/g as Pb	DOHMT	PBUT	50	0.2	1
Lead, Total	ug/L as Pb	DOTRACE	PBUT	10	0.003	0.015
Magnesium	mg/L as Mg	PRAA400	MGUR	0.5	0.005	0.025
	mg/L as Mg	PRAAS	MGUR	2	0.005	0.025
	mg/L as Mg	RMAAS	MGUR	10	0.02	0.1
	mg/L as Mg	WAAS	MGUR	50	0.1	0.5
Magnesium, Exchangeable Cations	meq/100 g Mg	DOCATION	MGESC	2.5	0.01	0.05
Manganese,						
Acid Ammonium Oxalate Extractable	% wt as Mn	DOMETOX	MNEOX	0.1	0.001	0.005
Citrate-Bicarbonate-Dithionite Extractable	% wt as Mn	DOMETDI	MNEDI	0.1	0.001	0.005
Sodium Pyrophosphate Extractable.	% wt as Mn	DOMETALX	MNEPY	0.05	0.001	0.005
Manganese, Total	ug/L	DOFEMN	MNUT	200	1	5
Nickel, Acid Extractable	ug/g as Ni	DOHMT	NIUT	50	0.2	1.0
Nitrogen,						
Ammonia plus Ammonium	ug/L as N	DONUT	NNHTFR	1000	1	5
	ug/filt N	PRAM	NNHTFR	50	0.05	0.25
	mg/L as N	PRAM	NNHTFR	2	0.002	0.01
	mg/L as N	PRAM	NNHTUR	2	0.002	0.01
	mg/L as N	RNDNP	NNHTFR	2	0.002	0.01
	mg/L as N	SDNP	NNHTFR	50	0.05	0.25

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1991

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Nitrogen, Nitrate	mg/L as N	PRIC1	NNO3UR	2	0.01	0.05
	ug/filt N	PRLOV	NNO3UR	100	0.5	2.5
	ug/filt N	PRSEQ	NNO3FR	50	0.2	1.0
	ug/filt N	PRSEQ	NNRICF	50	0.2	1.0
Nitrogen, Nitrate plus Nitrite	ug/L as N	DONUT	NNOTFR	1000	2	10
	mg/L as N	RNDNP	NNOTFR	5	0.005	0.025
	mg/L as N	SDNP	NNOTFR	50	0.05	0.25
	mg/L as N	WFNO3	NNOTUR	20	0.1	0.5
Nitrogen, Nitrite	mg/L as N	RNDNP	NNO2FR	0.2	0.001	0.005
	mg/L as N	SDNP	NNO2FR	2	0.005	0.025
Nitrogen, Total Kjeldahl	mg/L as N	RTNP	NNTKUR	2	0.02	0.1
	mg/L as N	STKNP	NNTKUR	50	0.05	0.25
Oxygen Demand, Biochemical	mg/L as O	SBBOD5	BOD5	400	0.2	1
Oxygen Demand, Chemical	mg/L as O	RCOD	COD	40	1	5
	mg/L as O	SBCOD	COD	500	2	10
pH		DOCOP	PH	14		
		DOT	PH	14		
		PHACD	PH	14		
		RATS	PH	14		
		WATS	PH	14		
		WQSDIRT	PH	14		
		DOSOILPH	PHECA	14		
		DOSOILPH	PHEW	14		
Phenolics, Reactive	ug/L Phenol	MPHEN	PHNOL	40	0.2	1
	ug/L Phenol	ROPHEN	PHNOL	50	0.2	1
Phosphorus, Reactive ortho-Phosphate	mg/L as P	RNDNP	PPO4FR	0.1	0.0005	0.0025
	mg/L as P	SDNP	PPO4FR	10	0.02	0.1
Phosphorus, Total	mg/L as P	RTNP	PPUT	0.2	0.002	0.01
	mg/L as P	STKNP	PPUT	10	0.02	0.1
	mg/L as P	DOP	PPUT1	100	0.2	1
	mg/L as P	DOP	PPUT2	100	0.2	1
Potassium	mg/L as K	PRAA400	KKUR	1	0.005	0.025
	mg/L as K	PRAAS	KKUR	1	0.01	0.05
	ug/filt K	PRLOVAA	KKUR	50	0.25	1.25
	mg/L as K	RMAAS	KKUR	5	0.01	0.05
	mg/L as K	WAAS	KKUR	25	0.05	0.25
Potassium, Exchangeable Cations	meq/100 g K	DOCATION	KKESC	0.75	0.01	0.05

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1991

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Sand	% wt as Sand . . .	DOPARTSZ	SAND	100 . .	1 . . .	5
Silicon,						
Acid Ammonium Oxalate Extractable	% wt as Si	DOMETOX . .	SIEOX . . .	0.25	0.01 . .	0.05
Reactive Silicates	mg/L as Si	ROM	SIO3UR . . .	10 . .	0.05 . .	0.25
Silt	% as Silt	DOPARTSZ . .	SILT	100 . .	1 . . .	5
Sodium	mg/L as Na	PRAA400 . .	NAUR	1 . .	0.005 . .	0.025
.	mg/L as Na	PRAAS	NAUR	4 . .	0.01 . .	0.05
.	ug/filt Na	PRLOVAA . .	NAUR	50 . .	0.25 . .	1.25
.	mg/L as Na	RMAAS	NAUR	20 . .	0.02 . .	0.1
.	mg/L as Na	WAAS	NAUR	100 . .	0.2 . .	1
Solids, Dissolved	mg/L	SOLIDS . . .	RSF	5000 . .	2 . . .	10
Solids,						
Ignited (Particulate Loss on Ignition)	mg/L	SOLIDS . . .	RSPLOI . . .	3000 . .	0.5 . .	2.5
Particulate	mg/L	SOLIDS . . .	RSP	3000 . .	0.5 . .	2.5
Total	mg/L or mg/Kg . .	SOLIDS . . .	RST	60000 . .	2 . . .	10
Sulphate,	ug/filt as SO ₄ . .	PRSEQ	SSO4FR . . .	250 . .	1 . . .	5
.	ug/filt as SO ₄ . .	PRSEQ	SSO4NF . . .	250 . .	1 . . .	5
.	mg/L as SO ₄ . . .	PRIC1	SSO4UR . . .	5 . .	0.05 . .	0.25
.	mg/L as SO ₄ . . .	PRIC1	SSO4UR . . .	10 . .	0.05 . .	0.25
.	ug/filt as SO ₄ . .	PRLOV	SSO4UR . . .	500 . .	1 . . .	5
.	mg/L as SO ₄ . . .	RMDSO4 . . .	SSO4UR . . .	100 . .	0.5 . .	2.5
Sulphate, Adsorbed	% by wt	DOPES	SSO4AD . . .	100 . .	0.5 . .	2.5
Sulphate, Organo-Sulphur	mg/L as SO ₄ . . .	ORGSO4 . . .	SSO4UV . . .	20 . .	0.05 . .	0.25
Sulphate, Water Extractable	ug/g SO ₄	DOANIONX . .	SSO4EW . . .	100 . .	0.5 . .	2.5
Sulphur Dioxide	ug/filt as SO ₂ . .	PRSEQ	SSO2FR . . .	350 . .	1 . . .	5
Turbidity	FTU	RMTUB	TURB	200 . .	0.05 . .	0.25
.	FTU	WTURB	TURB	200 . .	0.05 . .	0.25
Zinc, Acid Extractable	ug/g as Zn	DOHMTA . . .	ZNUT	100 . .	0.5 . .	2.5
Zinc, Total	ug/g as Zn	DOTRACE . . .	ZNUT	20 . .	0.001 . .	0.005



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1994-1995